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DISEASES CAUSED BY BACTERIA AND FUNGI.

ROLLE, M. (1932). Die Euterentzündungen bei Kühen in Lettland. I. Mitteilung. **[Mastitis of Cows in Lithuania. Part I].**—*Deuts. tierärztl. Wschr.* **40.** 257-260. 5 figs. [13 refs.]

ROLLE, M. (1932). Die Euterentzündungen bei Kühen in Lettland. II. Mitteilung. Streptokokken-Mastitis. **[Mastitis of Cows in Lithuania. Part II. Streptococcal Mastitis].**—*Ibid.* 609-614. 4 figs., 2 tables. [47 refs.]

Part I, which opens with a summary of the bacteriological findings in 200 cases, is devoted mainly to mastitis due to coliform bacteria. Of the 200 cases summarized, 34 per cent. were due to these organisms, 50 per cent. to streptococci, 11 per cent. to micrococci and 5 per cent. to *Corynebacterium pyogenes*.

After a brief reference to previous work, details are given of four typical examples of coliform mastitis together with a summary of the general findings in 68 cases. In seven cases death resulted, in nine cases slaughter was deemed advisable and in the remaining cases recovery followed promptly.

The points emphasized in connection with the usual acute form are the occurrence of more or less marked constitutional symptoms followed by death in from 5 to 10 per cent. of cases, the absence of leucocytes from the exudate which contains chiefly epithelial cells and the diffuse nature of the inflammatory process, which affects the whole quarter and particularly the alveolar cells.

The causal bacteria were uninfluenced *in vitro* by rivanol 1 : 1,000, but inhibited by chinosol 1 : 10,000. The author believes however that, *in vivo*, massage and stripping are of more value than infusions.

Part II deals with mastitis due to streptococci and is of particular interest because the author reports that typical " galt " streptococci were never found [" Gelber galt " is a term used in central and northern Europe, the English equivalent of which is chronic streptococcal bovine mastitis], but that 20 per cent. of the streptococcal cases were due to *Streptococcus pyogenes* and the remaining 80 per cent. to other streptococci which he divides into four groups. These streptococci were not β haemolytic and are said to be distinguished from " galt " streptococci by the production of short chains, a uniform turbidity in broth and in certain cases by peculiarities in colony type, in their characters in blood agar and in milk and in their resistance to decolourization after Gram-staining. The mastitis caused was similar in all cases and similar to that caused by coliform organisms ; prognosis was better. Mastitis caused by *Str. pyogenes* was acute and severe and in the media used the properties of the strains isolated were similar to those of

Str. pyogenes of man and of β haemolytic streptococci from horses and mice. —A. W. STABLEFORTH.

SEELEMANN, M., & SIEMONSEN, K. (1932). Experimente und Beobachtungen an Milchkühen im Rahmen der Galtforschung. IV. Mitteilung. Erfolgreiche Uebertragungsversuche durch Nassmelken. [**Experiments and Observations on Milch Cows in the Course of Mastitis Research. IV. Successful Transmission by Wet-Milking**].—*Arch. wiss. prakt. Tierhlk.* **65.** 522-533. 5 figs. [2 refs.]

Attempts to transmit infection by milking with hands which had been wetted with mastitis secretion were made in the case of 11 cows, with successful results in three cases. All had been regularly examined for a year or more before experiment.

In the first case, after 17 to 25 days, infection, accompanied by alteration of the milk but without clinical symptoms, appeared in one quarter only. Continuation of wet milking, and infection of the straw, for a further 17 days was not followed by transmission to the remaining quarters.

The second case was in one quarter of a cow which had been infected for some years in another quarter ; spontaneous recovery occurred.

The third case was in a young normal cow, one quarter becoming infected after 14 days, and a second quarter two and a half weeks later although milking with infected hands had ceased. In both quarters the milk remained normal in appearance, cell content, chloride and catalase content.—A. W. STABLEFORTH.

I. LOEWENTHAL, H. (1932). Ein Streptokokkenstamm von ungewöhnlicher Pathogenität. [**A Streptococcus Strain of Unusual Pathogenicity**].—*Zschr. Hyg. u. Infektkr.* **113.** 445-456. 4 tables, 1 chart. [6 refs.]

II. LOEWENTHAL, H. (1932). Ueber Beziehungen zwischen Wuchsform, Pathogenität und antigener Struktur bei Streptokokken. [**On Association between Growth Characters, Pathogenicity and Antigenic Structure in Streptococci**].—*Zlb. Bakt. I.* (*Ref.*). **106.** 381-382.

[A report of an address given to the Berliner mikrobiologische Gesellschaft, May 9th].

I. A spontaneous epidemic amongst mice was caused by a haemolytic streptococcus which was highly pathogenic by the mouth and more so by the nose : 90 per cent. of mice fed with 2 c.c. of culture died of septicaemia within a few days, whilst nasal infection with one drop of whole culture led to death in nearly all cases, and dilutions up to 1 : 1,000 were followed by results which were similar but somewhat slower and less regular in action. The M.L.D. by the intraperitoneal route was 10^{-5} c.c. The pathogenicity of this strain is contrasted with that of the Aronson strain which is relatively non-pathogenic by the mouth and nose. Twenty-four hours after nasal infection the streptococci were no longer recoverable from the nose. They were only detectable a day or two before death and became detectable in the blood at the same time. Faeces and urine contained the streptococci and so spread the disease. An artificial epidemic was produced by mixing nasally infected and normal mice.

In rabbits, nasal infection could only be produced occasionally ; subcutaneous injection into the ear produced a severe oedematous inflammation and intravenous injection of sublethal doses was frequently followed by purulent joint lesions. Young guinea pigs were unaffected by a few drops of culture by the nose. Serological and immunological data are given.

II. The author discusses the mouse epidemic reported above and describes

three types of colony, a mucoid form producing turbidity in broth and a non-mucoid form producing a deposit, both of which were highly pathogenic by the nose, and a third less haemolytic and less toxic form whose pathogenicity was very low by the nose but high intraperitoneally. Sera prepared with this third form showed a powerful protective effort against the serum strain, but none against the first two forms. The significance of the mucoid colonies which have been described in the case of certain streptococci isolated from septic sore throat (called *Str. epidemicus*), is discussed in relation to these findings.—A. W. STABLEFORTH.

I. ROBINSON, E. S., & MCCOMB, J. A. (1932). **Experimental and Natural Streptococcus hemolyticus Infection of the Udder of the Cow.**—*J. Infect. Dis.* **51.** 292-297. [9 refs.]

II. BROOKS, B. P. (1932). **The Relation of Bovine Mastitis to Human Infection.** —*J. Prevent. Med.* **6.** 111-116. [4 refs.]

I. The purpose of the experiments was to find out whether it were possible for a strain of *Str. haemolyticus* to acquire by residence in the cow's udder the special characters assigned to *Str. epidemicus*, and to study the course of infection with these organisms.

Cow 1, naturally infected, excreted *Str. epidemicus* for about two or three months in one abnormal and one apparently normal quarter. An attempt to infect another quarter of this cow with a small dose of *Str. haemolyticus* 54 (not *Str. epidemicus* but suspected of being concerned with an outbreak of sore throat) failed. In Cow 2, a normal cow, an attempt with a similarly small dose (? 600 organisms) failed, but injection of 1 c.c. of culture was successful, the infection persisting for the remaining four months of that lactation period, during which changes in the milk gradually appeared, through a dry period, and for six weeks of the next lactation : it then disappeared. Reinfection was successful, but only persisted for about a month. At this time another quarter was infected, severe trauma being intentionally produced by the use of a sharp needle. Severe and persistent mastitis followed.

Cultures of *Str. haemolyticus* isolated at intervals from cow 2 resembled in all respects those injected and never acquired any of the characteristics assigned to *Str. epidemicus*.

II. A brief review. The author does not favour the term *Str. epidemicus* because studies in his laboratory (New York State Department of Health) have shown that the haemolytic streptococci associated with throat conditions cannot at present be separated into specific groups.

Reference is made to outbreaks of gastro-enteritis in children said to be due to toxins from the common mastitis streptococci.—A. W. STABLEFORTH.

BURKY, E. L. (1933). **Studies on Cultures and Broth Filtrates of Staphylococci. I, II and III.**—*J. Immunol.* **24.** 93-114, 115-126 and 127-133. 2 figs., 7 tables, 1 chart. [24 refs.]

The author presents the results of cultural studies on three strains of staphylococci isolated from ocular sources and which are believed to be representative of strains found in other human lesions. It was found that certain strains produce, independently of haemolysins, a filtrable substance which is lethal for rabbits.

In the second paper the author confirms the findings of other observers that immunity can be induced in rabbits by intradermal injection of such staphylococcus filtrates. The variation in skin reactions of rabbits is also discussed and it is shown that such reactions can be correlated with immunity and also with the rabbits' reaction to a barium depilatory agent.

The third paper states that rabbits four months old and under are not susceptible to the lethal action of staphylococcus filtrates. Furthermore, they show no skin reaction.—GWILYM O. DAVIES.

HARNACH, R. (1932). Uhlákivá enzootie u zírného skotu a jeho disponovanost pro anthrax. [**Anthrax in Fat Cattle and the Causes of Infection**].—*Zverol. Obzor.* **25.** 251-261. [7 refs.] [Summaries in French and German : abst. from orig.]

In a group of 50 fat cattle 12 animals became infected with anthrax and 8 died. The infection was caused by the use of foreign foodstuffs. For the prevention of importation of foodstuffs contaminated with anthrax it is necessary to control international trade and transport of animal products such as hides, bones and foodstuffs. The transported foodstuffs should not come into contact with animals infected with or suspected to be infected with anthrax, or with objects capable of acting as carriers of anthrax infection.—E. PRIBYL (BRNO).

HRUSKA, K. (1932). Neue Forschungen auf dem Gebiete der Milzbrandtilgung. [**Investigations regarding Anthrax Eradication**].—*Prag. Arch. Tiermed.* **12.** 121-125.

The author reports that the mortality from anthrax has been considerably reduced by proper disposal of carcasses, disinfection and veterinary supervision of stock, but that the losses from this disease are still serious in some parts of Czechoslovakia. Regarding methods of protective inoculation, the use of sera has proved satisfactory for passive immunization. The Pasteurian vaccination method possesses the disadvantages that the first inoculation may cause a severe local reaction and, occasionally, death of the animal. Moreover, the resulting immunity does not last more than four months and sometimes four injections are necessary. The simultaneous inoculation method of Sobernheim, using a vaccine twice the quantity used in the Pasteur second vaccine, was found to have good results. The author mentions the encouraging results obtained from the use of vaccine prepared by treating anthrax bacilli with a certain glucoside.

—S. J. EDWARDS.

I. LAFENÊTRE, H. (1933). Un échec de la vaccination anti-charbonneuse intra-dermique en un temps chez le mouton. [**A Set-Back to the Intra-dermal Vaccination of Sheep against Anthrax**].—*Rev. vét. et J. Méd. vét.* **85.** 13-15. [1 ref.]

II. BESREDKA, A. (1933). Le principe de sérothérapie locale appliqué au charbon. [**The Principle of Local Sero-Therapy applied to Anthrax**].—*C. R. Soc. Biol. Paris.* **112.** 21-22. [3 refs.]

III. PINOY, P. E., & FABIANI, G. (1933). Sur l'immunité anticharbonneuse naturelle chez la Poule. [**Natural Anti-Anthrax Immunity in the Chicken**]. —*Ibid.* 331-333. [4 refs.]

I. The failure of the second vaccine to protect sheep against an infection with anthrax is recorded. The author advises the use of a smaller initial dose to be followed by a subsequent dose.

II. Liquid anti-anthrax serum given under the skin at a certain distance from infected regions was incapable of protecting the rabbit in doses of 5 to 10 c.c. This same serum injected under the skin beside the infected region protected half of the animals in doses of 2 c.c. When the serum was concentrated all the animals survived the infection.

III. PASTEUR (1878) showed that the fowl possessed a natural immunity

to *B. anthracis*. WAGNER (1890) found that infection could be set up by the injection of a culture of *B. anthracis* into the fowl. These authors were of the opinion that WAGNER had not correctly interpreted his results and repeated his experiments. A chicken inoculated with 2 c.c. of a culture of *B. anthracis* did not show a rise in temperature, although there was an inflammatory reaction at the site of injection which pointed to a natural immunity in these birds. This did not exclude a latent immunity due to a previous infection. To do this, six birds were raised under conditions to prevent infection with anthrax. At one month they were inoculated with 1 c.c. of anthrax culture and they showed no rise in temperature. Eighteen hours after injection, 1 c.c. of blood was taken from one of the chickens, broth was inoculated and a mouse was injected. The mouse did not die and nothing grew in the broth. Another chicken inoculated into the brain, but immersed in cold water, died in forty hours, whilst a control chicken likewise inoculated into the brain did not even show a rise in temperature.

—A. J. WILSDON.

GUNDEL, M., & KLIEWE, H. (1932). Experimentelle Untersuchungen über das antagonistisch wirksame Prinzip der Coli-gegenüber Milzbrandbazillen. **[Experimental Studies on the Active Principle in the Antagonism of *Bact. coli* towards Anthrax Bacilli].**—*Zlb. Bakt. I.* (*Orig.*). **124.** 519-528. [36 refs.]

The author demonstrates the inhibitory action of *Bact. coli* on the growth of anthrax bacilli both in liquid and solid media. By sowing equal amounts from fresh culture of these organisms into broth, it is shown that after four to eight days no living anthrax bacilli can be recovered. The same results are obtained when spores are sown into the broth. The inhibitory action on anthrax bacilli only takes place in the presence of living coliform organisms and it is shown that metabolic substances produced during the growth of *Bact. coli* in broth have no such effect.

The same bacterial antagonism is demonstrated by means of *in vivo* tests on mice. The subcutaneous injection of 0·01 c.c. of a mixture of *Bact. coli* and *B. anthracis* cultures did not cause death, although the control mice injected with the same dose of anthrax bacilli died within 20 hours.—S. J. EDWARDS.

CHRISTISON, May H. (1933). **Dissociation in Certain Mycobacteria with Special Reference to Type-Stability.**—*J. Path. & Bact.* **36.** 285-297. 15 figs. on 3 plates, 1 table. [19 refs.]

A study on dissociation occurring amongst some of the rapidly growing mycobacteria is recorded. Cultures of Brinckerhoff's " lepra " bacillus, Cobbett's fish tubercle bacillus, Friedmann's tortoise tubercle bacillus and *Mycobacterium rubrum* were included in the study. Among these mycobacteria, many colonial variants occurred. The colonies showed varying degrees of stability which appeared to depend to some extent on environmental conditions. As no evidence was obtained of any absolute stability amongst the variants, the author regards an attempt to base a classification of these organisms on colony types and related characteristics as impracticable. She deprecates the emphasis occurring in the literature on the so-called S to R variation, pointing out that, although the general trend of dissociation may be from S to R, yet in many species numerous forms differing in degree and varying in their stability occur between the two extreme types. Besides colony formation, details of variation occurring in her strains of mycobacteria in such other characters as type of growth in fluid medium, emulsibility in saline, cell morphology and pigment formation, are also noted.

—R. LOVELL.

—. (1933). **Report of Committee on Tuberculosis.**—*J. Amer. Vet. Med. Ass.* **82.** 528-538. [Report presented at 36th Annual Meeting of the United States Live Stock Sanitary Association].

This report consists of two parts. Part I is concerned with the rewriting of certain paragraphs of the Uniform Methods and Rules [U.S.L.S.S.A.] for the establishment and maintenance of modified accredited areas and Part II with suggestions which have been put forward for determining the incidence of bovine tuberculosis among range cattle.

Following its presentation to the meeting, Part II gave rise to considerable discussion. Owing to the difficulty of testing range cattle, an amendment was put forward that such cattle should be included in modified tuberculosis-free accredited areas when a *post-mortem* examination of at least 10 per cent. of the herd had shown tuberculosis to be absent. This was finally rejected by the meeting and the report adopted.—GWILYM O. DAVIES.

NINNI, C., & BRETEY, J. (1933). Résultats de la recherche des Bacilles acido-résistants dans les organes des Cobayes par la culture des organes. [**Cultural Investigation for the Presence of Acid-Fast Bacilli in the Organs of Healthy Guinea Pigs**].—*C. R. Soc. Biol. Paris.* **112.** 249-251.

In view of the claims made by COOPER and PETROFF, and by FROBISHER that acid-fast bacilli occur in the lymph glands of healthy guinea pigs, the authors have investigated the question.

They made cultures on Löwenstein's medium of the spleen, tracheo-bronchial and other lymph glands of 38 adult guinea pigs which died or were killed during routine work. The tubes were incubated for two months and all remained sterile.

In a second experiment, the skin and subcutaneous tissue of the abdomen from five adult and two still-born guinea pigs were inoculated subcutaneously into healthy guinea pigs. Cultures made from the internal organs and from the site of inoculation of six of the seven inoculated guinea pigs remained sterile ; from the seventh guinea pig a saprophytic acid-fast bacillus was isolated from the site of inoculation. The authors believe that this organism resulted from contamination of the skin by the wet litter.—T. M. DOYLE.

HARNACH, R. (1932). Vyvoj tuberkulosy po minimální dávce infekcní a preparaci Polysanem. [**Development of Tuberculosis in Animals Infected with Minimal Doses of Tubercle Bacilli and Treated with Polysan**].—*Zverol. Rozpravy.* **6.** 121-126 and 133-134. 1 table. [5 refs.]

Guinea pigs infected subcutaneously with about 150 bovine tubercle bacilli died in 17 to 35 weeks after infection. The treatment of infected animals with " polysan " (colloidal magnesium hydroxide) gave no protection against infection and the development of tuberculosis.—E. PRIBYL (BRNO).

I. UNVERRICHT, & DOSQUET, S. (1932). Die direkte Züchtung der Tuberkelbazillen aus dem Blut (nach Löwenstein). [**The Direct Cultivation of Tubercle Bacilli from Blood (Löwenstein)**].—*Zschr. Tuberk.* **63.** 338-340.

II. OEKONOMOPOULO, N. B., PAPANIKOLAOU, B., & JOANNIDES, G. (1932). Versuche betreffend Tuberkelbazillämie bei Lungentuberkulösen nach dem Löwensteinschen Züchtungsverfahren. [**Research on Tubercle Bacillaemia in Pulmonary Tuberculosis by Löwenstein's Method of Cultivation**].—*Ibid.* 340-342. [11 refs.]

I. Blood cultures were made from 91 obvious cases of phthisis with one success.

II. Blood cultures were made in 18 cases of severe progressive phthisis by Löwenstein's original method. In no case was cultivation successful.

—A. W. STABLEFORTH.

GLOYNE, S. R. (1933). **Avian Tuberculosis with Special Reference to Infection in Man.**—*Bull. Hyg.* **8.** 39-44. 1 table. [29 refs.]

The author discusses infection caused by avian tubercle bacilli in animals and man. He states that SCHALK found that avian tubercle bacilli were viable after two years in farmyard soil. The bacilli occasionally occur in the eggs of affected fowls : the percentage of infection mentioned by different workers varies considerably ; it is probably under 1 per cent. According to BELLER, acid-fast saprophytes occur in eggs and this fact may possibly explain the discrepancies in the estimates given. Infection of cattle with avian tubercle bacilli usually takes the form of isolated lesions. VAN ES records that avian tubercle bacilli were isolated from 11 of 115 cattle exhibiting isolated tuberculous lesions. WOLTERS and DEHMEL isolated the avian type of bacillus from 9 out of 400 samples of milk examined.

GRIFFITH states that about 30 per cent. of all cases of localized tuberculosis in swine is caused by avian tubercle bacilli.

BRANCH in a recent survey of the literature estimated that there are about 14 authentic cases of infection in man caused by the avian type of tubercle bacillus.

" The clinical diagnosis of infection of man with avian tubercle bacilli is impossible. BRANCH lays stress on the following points : (1) long-continued remittent fever with enlargement of the spleen, metastases in skin and lymph nodes (a type which may be confused with Hodgkin's disease or, as LÖWENSTEIN suggests, with leukemia) ; (2) cutaneous lesions of four different types—(a) an aphthous septicæmic form with changes in bones and joints ; (b) a sarcoid form ; (c) a gumma-like lesion ; and (d) a local ulcerous form, the ulcers tending to heal and recur (the differential diagnosis here lies between syphilis, atypical tuberculosis, sporotrichosis or even leprosy) ; (3) a urogenital form in which a rapid disappearance of the bacilli following treatment with avian tuberculin has been reported."—

—T. M. DOYLE.

VALTIS, J., PAISSEAU, G., & VAN DEINSE, F. (1932). Sur deux types différents de Bacilles paratuberculeux isolés de l'expectoration d'un enfant atteint de lésions pulmonaires tuberculeuses. [**Isolation of Two Different Types of Paratubercle Bacilli from the Expectorate of a Child Affected with Pulmonary Tuberculosis**].—*C. R. Soc. Biol. Paris.* **111.** 300-302. [1 ref.]

The authors record the isolation of two different types of paratubercle bacilli from the throat exudate of a child affected with pulmonary tuberculosis. The two types were distinguished by the production of different coloured pigments on artificial media.—T. M. DOYLE.

LONG, E. R. (1932). Die Chemie der Tuberkelbakterien. Eine Ubersicht. [**The Chemistry of Tubercle Bacilli**].—*Zschr. Tuberk.* **64.** 78-87. [63 refs.]

A short review of the chemistry of tubercle bacilli. The author discusses the chemical requirements of artificial culture media and the effects of the tension of oxygen and carbon dioxide in the surrounding atmosphere of growing cultures. The nature of the bacterial bodies, especially of their lipoid and protein constituents, is considered and our knowledge of the nature of the substances responsible for the activities of tuberculin is reviewed.—W. R. WOOLDRIDGE.

ZEKI, M. (1932). Ueber Corynebacterien. [**On the Corynebacteria**].—*Inaug. Diss. Leipzig.* pp. 75. 4 tables. [51 refs.]

A general review of the corynebacteria followed by a report on 20 strains

studied by the author. These included a strain of *C. diphtheriae*, ten strains of corynebacteria from the healthy udders of cows, one strain from a vaginal discharge from a cow, one from a case of ovine pseudo-tuberculosis and seven from pus obtained from horses.

Blood agar was a particularly suitable medium for obtaining pure cultures, and was incubated both aerobically and in 10 per cent. carbon dioxide. One strain did not grow aerobically. The following properties were studied :—morphology, growth and colony form on plain agar, serum agar, blood agar and on coagulated serum ; growth in broth, serum broth, peptone water, trypsin broth and milk ; gas requirements, viability, ability to reduce nitrates or produce sulphur-dioxide or indol, nitrogen requirements, ability to ferment various substances or to split hippuric acid, and pathogenicity for guinea pigs and mice.

Morphology was dependent on the medium and on the age of the culture, granule formation being most pronounced in cultures grown on serum agar containing 3 to 8 per cent. of lithium chloride, but also good on solid serum and, to a less degree, on blood agar. Certain strains showed granules only on lithium agar or not at all.

Nitrates were not reduced or sulphur dioxide produced and indol formation was variable. All strains split hippuric acid, but to diverse degrees.

Neither by growth characteristics on the various media, nor by gas or nitrogen requirements, nor by fermentation abilities or pathogenicity was it possible to classify corynebacteria in agreement with their source.—A. W. Stableforth.

Marsh, H. (1933). **The Serological Identity of Strains of Erysipelothrix rhusiopathiae of Ovine and Porcine Origin.**—*J. Amer. Vet. Med. Ass.* **82.** 584-586. 1 table. [1 ref.]

In a previous article [see this *Bulletin.* **1.** 32.] the author described a chronic arthritis in lambs caused by infection with *Erysipelothrix rhusiopathiae.* As this occurred in sheep that had not been in contact with swine, and in regions where swine erysipelas was not known to occur, serological tests were carried out to determine whether the ovine and porcine strains of this organism were identical. The technique adopted is described and the results are tabulated. The results indicated that three strains of *E. rhusiopathiae*, one from a Montana lamb, one from a New Zealand lamb, and one from a case of swine erysipelas were, as far as agglutinins were concerned, serologically identical.—Ll. E. W. Bevan.

Drescher, & Hopfengärtner. (1933). Verhalten von Fleischvergiftungserregern in der Aussenwelt. **[Behaviour of Meat Poisoning Organisms in Material other than Meat].**—*Münch. tierärztl. Wschr.* **84.** 25-29. 1 table. [12 refs.]

After a review of the literature of the subject, the authors describe their own experiments to discover (1) whether the presence of *Bact. enteritidis* Gärtner could be demonstrated in objects surrounding infected animals and (2) how long that organism and also *Bact. paratyphosum* B and the Breslau bacillus can remain alive in different media, e.g. dung, ichor, milk and water.

(1) In stables occupied by cattle infected with *Bact. enteritidis* Gärtner the specific organism was found in surrounding objects, not only on the hair of animals which excrete the bacillus in their dung, but also on the hair of uninfected animals standing in the same stable ; also on the stable utensils such as dung forks, besoms, straw, etc. There is thus the danger of an indirect transference of the organism to other stables and to human beings, e.g. through milk and meat contaminated with such material.

(2) The organisms can live in dung, ichor, milk, water, etc., for several weeks, so that this again may account for much indirect transference of meat poisoning infections.—F. BULLOCK.

I. JORDAN, E. O., & MCBROOM, J. (1932). **Occurrence of Brucella Agglutinins in Cattle in the Panama Zone.**—*J. Amer. Vet. Med. Ass.* **81.** 401-404. 4 tables. [3 refs.]

II. PLASTRIDGE, W. N. (1932). **Agglutinin Absorption Studies on the Genus Brucella.**—*J. Bact.* **23.** 111-112.

III. NAIK, R. N. (1932). **Agglutinability of Homologous and Heterologous Strains of Brucella Organisms during the Course of *Bacillus abortus* Bang Infection.**—*Ind. J. Vet. Sci. & Anim. Husb.* **2.** 262-264. 1 table. [2 refs.]

IV. DAMON, S. R. (1932). **Some Observations on the Natural Course of the Brucella Agglutination Reaction in a Dairy Herd over a Four-Year Period.**—*Amer. J. Hyg.* **16.** 798-805. 8 tables.

I. The extent of infection by *Br. abortus*, as determined by the agglutination test, is reported in a dairy herd of 383 milking cows, 14 bulls and 12 yearling heifers in the Panama Zone. Taking these as a representative sample of the area it would appear that infection is present to a less degree than in many parts of the U.S.A.

Out of 28 men engaged in handling the milk, the serum of only one gave a positive reaction and that up to 1 : 40. Undulant fever in man has not yet been reported in this area.

II. In a brief note the author here records the results of his study of the serological characteristics of a large number of varieties of brucella of human, bovine, porcine, equine and caprine origin.

He is led to the conclusion that it is impossible to identify, with certainty, strains of *Br. abortus* by means of the agglutinin-absorption test.

III. The knowledge that the agglutinability of different varieties of *Br. abortus* Bang is not uniform led the author to make a short comparative study of two English and two Indian varieties. He found that the serum of a bull inoculated with one of the English varieties gave a positive agglutination reaction with the homologous antigen for nearly a year, but only for several months with the heterologous antigens. When the acuteness of an attack has worn off the serum may fail to agglutinate an antigen prepared from heterologous varieties.

IV. A critical examination of the results obtained after carrying out a systematic agglutination test of a herd of between 225 and 250 animals over a period of four years.

The herd consisted of three units on separate premises :—(1) milking cows ; (2) heifers under breeding age and (3) heifers of breeding age and heifers in-calf. The results of the test are analysed in relation to the above grouping and also classed according to titre.

The author discusses the significance of a low titre and, in agreement with other workers, finds that the percentage of animals with a high titre which revert to negative reactions is very small, although 5·5 per cent. of those with a titre of less than 1 : 20 revert permanently to negative reactions.—N. BARRON.

I. SLATTER, E. E., & GRAHAM, R. (1933). **Effect of Trypan Blue, Thionin and Pyronin on the Agglutination Titre of Cows infected with Bang's Disease.**—*J. Amer. Vet. Med. Ass.* **82.** 76-78. [7 refs.]

II. DONHAM, C. R. (1933). **Some of the Things we should recognize concerning the Agglutination Test for Bang's Disease.**—*Ibid.* 327-335.

I. Owing to the fact that many veterinarians and stockmen still appear to attach importance to the drug treatment of contagious abortion, the authors undertook experiments in which they injected into cattle large doses of the drugs which they considered most likely to prove effective. Three groups of six animals, positive to the agglutination test, continued to react after treatment for eight months with trypan blue, thionin and pyronin respectively. Three abortions occurred in the pyronin group.

II. This is a general article dealing with the application of the agglutination test to the eradication of contagious abortion. A plea is made for the adoption of a standard technique in laboratories. The limitations of the test are enumerated. The author decries attempts to standardize the rapid test to the tube test, as the reactions in the two tests depend on different physico-chemical phenomena.—R. S. ROBERTS.

I. SCHMIDT, W. (1932). Neuere Untersuchungen über den Bangschen Abortus. [**New Studies on Bang's Disease**].—*Deuts. tierärztl. Wschr.* **40.** 702-705. 1 table. [5 refs.]

II. WITTE, J. (1932). Beitrag zu den primär durch Abortus- und Pyogenesbakterien bedingten Erkrankungen der Kälber. [**Primary Diseases of the Calf caused by** *Br. abortus* **and** *Corynebact. pyogenes*].—*Berl. tierärztl. Wschr.* **48.** 338-341. [16 refs.]

I. The examination of 2,079 samples of mixed quarter milk showed that 10 per cent. contained *Br. abortus*, but in none of these cases was there any associated udder disturbance.

The injection *via* the teat canal of 1 c.c. of *Br. abortus* culture into the udder of a healthy cow did not give rise to any apparent symptoms, but following a dose of 5 c.c., a subacute form of mastitis ensued. Brucella organisms were recovered from both the milk deposit and cream of the infected quarter and after six weeks they were found in the uninoculated quarters. Seven days after infection, specific agglutinins were present in the milk of the infected quarter, the maximum titre (1 : 1,600) being reached four days later. At this time the milk of the uninfected quarters showed agglutinins in the same concentration. After slaughter, brucella organisms were found in the udder, iliac and popliteal glands and the uterine mucosa.

II. *Br. abortus* was isolated in pure culture from the organs of an eight-day-old calf which had died from an acute enteritis. Contagious abortion was known to exist in the herd and ten other calves had died showing the same disease symptoms. Since no other bacteria were found in the first case and since the blood of the calf showed specific agglutinins in a titre of 1 : 200, the author concludes that *Br. abortus* was the cause of death. The condition is said to be successfully treated by the administration of immune serum of high antibody titre.

In a herd known to be free from Bang's disease, *Corynebact. pyogenes* was isolated from the abomasum of an aborted foetus. Four calves also died of an acute septicaemia and, although no organism was actually isolated from these cases, it is thought probable that *C. pyogenes* was the cause of death. Following the administration of vaccine to pregnant cows six weeks before calving and also to the calves, there were no further deaths.—S. J. EDWARDS.

RUNDBERG, G. (1932). Eine Experimentelle Studie über die Immunitätsverhältnisse bei Bang's Abortus bazillus. [**An Experimental Study on the Immune Properties of Bang's Abortion Bacillus**]. Academic Dissertation. pp. 75. 93 tables. [171 refs.] Published as No. 2 of Vol. **58.** pp. 77-152 of *Svensk,*

Läk.-Sällskapets Handlingar. [Orig. in German].

After summarizing the views of other workers regarding the mechanism of immunity against *Br. abortus*, the author records with full details the results of his own experiments, which were designed to find out, first, whether bactericidal agents for *Br. abortus* are present in normal sera, how far these can be increased by vaccination and what part is played by leucocytes, lymphocytes, thrombocytes and histiocytes respectively and, secondly, the nature of the bactericidal agent. PETTERSSON has divided bactericidal agents into two classes which he designates α lysin (sensitizing antibody and complement) and β lysin respectively. The β lysin is distinguished from the α lysin by its physical and chemical properties. *Bacillus subtilis* is sensitive to the β lysin and *Pseudonomas pyocyanea* to the α lysin. These two organisms were used as controls in many of the *in vitro* experiments reported in this article.

Normal sera were obtained from human beings, goats, horses, cats, guinea pigs and rabbits ; plasma was also obtained from rabbits. Immune sera were prepared with living bacteria in rabbits and goats. The various cells were obtained by appropriate methods from rabbits and guinea pigs. Three strains of brucella were used and behaved similarly. One was of bovine origin whilst two were isolated from human beings. In the *in vitro* tests, various numbers of bacteria were added to normal or immune serum or its derivatives, in the natural state or after heating to various degrees, or after irradiation from a Quartz lamp, and plate counts were made at intervals during subsequent incubation. Incubation of both tubes and plates was carried out in an atmosphere containing carbon dioxide. The basic medium was veal broth containing 30 to 40 per cent. of inactivated ascitic fluid.

The author summarizes his findings as follows. Normal serum contains active bactericidal agents for *Br. abortus*. These are characterized by their thermostability (at 56°C. to 63°C.) and their great resistance to radiant energy ; further, they follow in part precipitation of the globulin by dilution of the serum with distilled water and passage of carbon dioxide ; they are not damaged by treatment of the serum with acetone or ether, and consist of an activating and an activable component. These bactericidal agents are also present in plasma. Immune sera, obtained by vaccination, although more or less rich in other antibodies (agglutinins, precipitins and complement-fixing antibodies), never show, in comparison with normal sera, an increase in bactericidal properties, either *in vivo* or *in vitro*. These properties can be summarized by saying that *Br. abortus* behaves as a β lysin–sensitive bacterium in the sense of PETTERSSON. In experiments with one human strain that was pathogenic to white mice, immune sera showed no absolute protective action against a certainly fatal dose. Of the cells and cell extracts used, only extracts from leucocytes or thrombocytes showed a bactericidal action *in vitro* ; the action was strongest in the case of leucocytes. *In vivo*, leucocytes and immune serum, used together, appeared to have some protective action.

—A. W. STABLEFORTH.

DELEZ, A. L. (1932). **Studies in Calfhood Immunization against Bang's Disease.** —*J. Amer. Vet. Med. Ass.* **81.** 239-245. 2 tables. [4 refs.]

The possible value of calfhood vaccination as a means of developing immunity against Bang's disease infection was studied in a group of five heifers which, at the age of four weeks, had been injected intravenously with a strain of *Br. abortus* pathogenic for guinea pigs. Following the establishment of pregnancy, two heifers received a further injection, but no exposure was given to the others. The first two heifers aborted soon after the second injection. Of the remaining three,

one aborted and *Br. abortus* was recovered from the foetus and colostrum ; the other two carried their calves to full term although the foetal membranes of both showed extensive necrosis of the cotyledons.—S. J. EDWARDS.

I. CARPENTER, C. M., & BOAK, Ruth A. (1932). **The Isolation of** *Brucella abortus* **from Tonsils.**—*J. Amer. Med. Ass.* **99.** 296-298. 1 table. [6 refs.]
II. POELMA, L. J., & PICKENS, E. M. (1932). **Brucella abortus in Human Tonsils.**—*J. Bact.* **23.** 112-113.

I. Five years ago, when most of the milk of the city of Ithaca, N.Y., was not pasteurized and the mixed milk of 9 out of 50 herds contained *Br. abortus*, an examination of tonsils from 55 human beings was carried out. The tonsils were removed by surgeons after such clinical diagnoses as abscess, hypertrophy, chronic tonsillitis, rheumatism and arthritis, were made. *Br. abortus* was isolated by direct methods from the tonsils of two patients and by guinea pig inoculation in these two and five other cases. During the early part of 1932, *Br. abortus* was also isolated from the tonsils of a patient suffering from undulant fever with a chronic tonsillitis. It is concluded that the presence of the organisms in the tonsils must be the result of ingesting dairy products containing *Br. abortus*. The incidence probably depends upon the numbers and virulence of the organisms in the raw milk supply.

II. 117 pairs of tonsils from human patients living in rural districts were examined : negative results were obtained in attempts to demonstrate *Br. abortus* by direct cultural methods, incubation being carried out in an atmosphere containing 10 per cent. carbon dioxide.

Guinea pigs were also injected with suspensions of 116 of the pairs of tonsils. Four animals representing two pairs of tonsils gave positive agglutination reactions after six or seven weeks and *Br. abortus* was recovered from their tissues.

—R. LOVELL.

LOMBARDO, F. (1932). La *Brucella melitensis* nei polli e nelle uova. [**The Presence of** *Brucella melitensis* **in Fowls and in their Eggs**].—*Ann. Igiene.* **42.** 33-35.

The researches on spontaneous infection with *Br. melitensis* in fowls have been based mainly on the sero-agglutination test.

EMMEL and HUDDLESON attempted artificial infections with *Br. melitensis* ; the results were not constant and were not conclusive.

It appeared of importance to the author to ascertain experimentally whether fowls may be infected by *Br. melitensis* and whether it may be found in their eggs.

Nine hens of " Sicilian flower bird " breed were tested for *Br. melitensis* by the agglutination test with blood serum, haemoculture and cultural tests of their eggs, and were found free.

A heavy dose was given intravenously to the nine fowls. The result of the infection was negative to all available laboratory tests with the exception of the blood serum agglutination test, which was positive at the dilution of 1 : 50 to 1 : 200. There was also absence of anatomical-pathological lesions on *post-mortem* examination of three fowls.

The author admits that further experiments are necessary for proving definitely that fowls are not infected by *Br. melitensis* and that fowls' eggs are not carriers of the organism.—F. VEGLIA (TURIN).

I. REALE, M. (1932). Septicémie de Bang. [**Bang's Septicaemia**].—*Rev. méd. Suisse romande.* **52.** 321-334.

II. Parisot, J., Vidal, L., & Robert-Lévy. (1932). Infection humaine à *Brucella melitensis* d'origine bovine : identité des propriétés biologiques des souches isolées. [**Human Infection with *Brucella melitensis* of Bovine Origin : Identity of the Biologic Properties of the Strains Isolated**].—*C. R. Soc. Biol. Paris.* **110.** 78-79. [2 refs.]

III. Turcu, T., & Morariu, E. (1932). Recherches dans un foyer endemique d'avortement infectieux suivi d'infections consécutives de fièvre ondulante. [**Research in an Endemic Focus of Infectious Abortion followed by Consecutive Infections with Undulant Fever**].—*Ibid.* 1145-1146. [2 refs.]

I. A report of two cases of undulant fever in human beings, followed by a general discussion in which preference is given to the name used in the title.

II. Strains of *Br. melitensis* were isolated from a woman in Meurthe-et-Moselle and from her cow. Their characters, both biochemical and serological, were similar and typical of *Br. melitensis.*

III. Two cases of undulant fever occurred in a small Roumanian village, one in a dairyman, the other in a man who attended a cow which had aborted. The agglutinin titre for *Br. abortus* was 1 : 1,280 in both cases, and titres of 1 : 40 to 1 : 160 were found in 5 other persons out of 14 tested. The infections are believed to have originated in an outbreak amongst the cattle.—A. W. Stableforth.

I. Gilles, M., Pèrés, G., & Culty. (1932). Fièvre ondulante d'origine bovine à Brucella melitensis. [**Undulant Fever of Bovine Origin due to *Br. melitensis***].—*Rev. gén. Méd. vét.* **41.** 476-480. 1 table.

II. Ledoux, E. (1932). La fièvre ondulante d'origine bovine. L'endémie franc-comtoise. [**Undulant Fever of Bovine Origin ; the Franche-Comté Endemic**].—*J. Méd. Lyon.* **13.** 149-154. 3 figs.

I. Three cases of undulant fever occurred simultaneously amongst the personnel of a dairy farm badly infected with brucellosis ; 8 out of 12 cows gave a titre of 1 : 80 or over and one had recently aborted. Brucella, which by tests for the production of hydrogen sulphide and for the action of thionin and fuchsin were indicated to be of the *melitensis* variety, were isolated from the blood of two of the patients and from the milk of two of the cows.

II. A brief review based on 22 cases which have been diagnosed in the province of Franche-Comté during the last three years. Twenty-one were of bovine origin and nearly all were in male peasants who tended cattle which had aborted. The exact nature of the brucella was not determined.

—A. W. Stableforth.

I. Dubois, C., & Sollier, N. (1932). Sur deux cas de fièvre ondulante d'origine bovine observés dans le Gard et dans la Haute-Garonne. [**On Two Cases of Undulant Fever of Bovine Origin observed in Gard and in Haute-Garonne**].—*Bull. Acad. méd. Paris.* **107.** 743-748. [10 refs.]

II. Sautet, J. (1932). Quelques remarques sur la fièvre ondulante en Corse. [**A Few Remarks on Undulant Fever in Corsica**].—*Bull. Soc. Path. exot.* **25.** 863-866. 1 table. [7 refs.]

III. Goddard, T. R. (1932). **A Case of Abortus Fever in Hertfordshire.**—*Brit. Med. J.* Oct. 8th. 672.

I. Both cases are believed to be contact infections of bovine origin, and occurred in regions in which such infections had not previously been recognized. In one of these (Gard), infection from goats or sheep is common. One occurred in a dairyman who had no contact with sheep or goats and never took milk or milk products, the other in a veterinarian.

II. Twenty cases are discussed. All occurred in middle or old age, 18 being in peasants and 2 in town dwellers. In the case of at least four patients infection from milk or milk products could be ruled out and two of these had never been in contact with animals. The author suggests that water from mountain streams usually regarded as satisfactory for drinking purposes may be contaminated by the urine of infected animals.

III. Illness lasted about three months, the titre for *Br. abortus* being 1 : 160.
—A. W. STABLEFORTH.

BENNETTS, H. (1932). **Infectious Entero-toxaemia (The so-called Braxy-like Disease) of Sheep in Western Australia.**—*Council Sci. & Indust. Res. Australia.* Bulletin No. 57. pp. 72. 11 figs. on 2 plates, 9 tables, 1 map. [76 refs.]

This bulletin gives a complete account of investigations carried out upon the aetiology of infectious entero-toxaemia, a disease responsible for considerable losses among sheep in Australia. The causal organism is a new species of anaerobe and is closely related to *Clostridium welchii*, the bacillus of lamb dysentery and *Cl. paludis*, from which it is differentiated by cross-immunity tests. The disease is produced by the proliferation of the organism in the small intestine, its toxin being absorbed into the body. It has not been possible to identify the factors which enable the organism to proliferate to the extent of producing disease, but it is believed to be in some manner connected with intestinal stasis. Preliminary work on active immunization has given promising results. Other control measures suggested aim at the prevention of intestinal stasis.—R. S. ROBERTS.

KRANEVELD, F. C., & DJAENOEDIN, R. (1932). Anaërobe Bacillen en de door hen Veroorzaakte Infecties bij de Huisdieren in Nederlandsch-Indië. VII. De bacillus phlegmones emphysematosae (Eug. Fraenkel) als normale darmbewoner bij gezoude paarden. [**Anaerobic Bacilli in Infectious Diseases in Domesticated Animals in the Dutch East Indies. VII.** *Bacillus phlegmonis emphysematosae* **(Fraenkel) as a Normal Inhabitant of the Intestine , in Healthy Horses**].—*Ned.-Indisch. Blad. Diergeneesk.* **44.** 232-234. [Summaries in English and German : abst. from orig.]

In an earlier paper [(1932). *Ned.-Indisch. Blad. Diergeneesk.* **44.** 125.] the authors record the occurrence of Fraenkel's bacillus as a normal inhabitant of the intestine of the buffalo. In the present paper they state that they have examined material from the rectum of 25 horses, and have been able to recover the bacillus in every instance.—A. LESLIE SHEATHER.

MARSH, H., TUNNICLIFF, E. A., & JUNGHERR, E. (1932). **Types of Clostridium welchii found in Dysentery of Lambs.**—*J. Infect. Dis.* **51.** 330-335. 2 tables. [4 refs.]

A detailed study has been carried out of 19 strains of *Cl. welchii* isolated from the intestines of lambs affected with a fatal diarrhoea in Montana. A strain of Dalling's lamb dysentery bacillus and a typical *Cl. welchii* were also examined with a view to comparing the biochemical and toxigenic properties of these organisms with those isolated in Montana. It was found that none of the strains studied corresponded in their reactions to the organism described by Dalling as the cause of lamb dysentery in England.—A. J. WILSDON.

METTAM, R. W. M., & CARMICHAEL, J. (1933). **Necrobacillosis in Recently Captured Antelope in Uganda.**—*J. Comp. Path. & Therap.* **46.** 16-24. [6 refs.]

In this outbreak seven duiker (*Cephalophus* species), one oribi (*Montana Cottoni Cottoni*), and two reedbuck (*Reduca Reduca Wardi*) became fatally infected after two to three weeks confinement in old stabling at the laboratory. The symptoms were those of an intense necrosis of the buccal tissues, great prostration and, in the case of the oribi, acute pleuro-pneumonia. Bacteriologically the condition was apparently primarily due to *Actinomyces necrophorus* though attemps to isolate it in pure culture failed. Endeavours to transmit the disease by contact to young domestic ruminants were not successful, but inoculation of morbid material set up acute abscesses from which experimental animals recovered. It is pointed out that calf diphtheria has not as yet been recorded on these premises.
—EDWARD F. PECK.

SCHEUBER, J. R. (1932). **The Occurrence of B. oedematiens in South Africa.**—*18th Rep. Direct. Vet. Serv. & Anim. Indust. Union of S. Africa.* Part I. 141-143. [4 refs.]

The purpose of this article is to place on record the finding of *Clostridium oedematiens* in South Africa in the head of a sheep which had died of gangrenous oedema following " crow pick." This condition, recorded also in Australia by EDGAR, occurs in all classes of sheep, but especially in those in low condition and ewes heavy in lamb. The gangrenous oedema extends from the infected wound and the infection always ends fatally. The organism isolated corresponds with typical *Cl. oedematiens* in its morphology, cultural and immunological characters and pathogenicity.—S. H. GAIGER.

REID, J. D. (1932). **Sensitivity of a Group of Fluorescent Organisms of the Genus Pseudomonas to Physico-Chemical Germicides.**—*Amer. J. Hyg.* **16.** 557-565. 4 tables. [15 refs.]

A number of strains of *Pseudomonas pyocyanea* and of *Ps. fluorescens* were submitted to the action of phenol or of mercuric chloride. For an examination of the bactericidal effect of these substances, the organism, cultured in Armour's peptone broth, was submitted to different concentrations of the disinfectant for 15 minutes at 20°C. It was then immediately sub-cultured. It was found that for *Ps. pyocyanea* the bactericidal concentration of phenol varied between 1 : 90 and 1 : 100, whilst for mercuric chloride it varied between a dilution of 1 : 55,000 to 1 : 230,000. With *Ps. fluorescens* the corresponding dilutions were, for phenol 1 : 110 to 1 : 120 and for mercuric chloride 1 : 110,000 to 1 : 300,000. The bactericidal activity of phenol for several strains of *Bact. coli* corresponded to that for *Ps. pyocyanea* whilst the necessary dilution of mercuric chloride varied from 1 : 40,000 to 1 : 170,000. The concentration of these substances necessary to inhibit growth for 48 hours were as follows :—*Ps. pyocyanea*—phenol 1 : 650 to 1 : 750, mercuric chloride 1 : 30,000 to 1 : 300,000 ; *Ps. fluorescens*—phenol 1 : 800 to 1 : 1,200, mercuric chloride 1 : 30,000 to 1 : 300,000 ; *Bact. coli*—phenol 1 : 400, mercuric chloride 1 : 230,000 to 1 : 360,000.

It will be noticed that, contrary to expectation, certain strains of *Ps. pyocyanea* and *Ps. fluorescens* actually require a greater concentration of mercuric chloride to inhibit growth than that which has proved to be bactericidal. The author suggests that this apparent anomaly is due to a few resistant forms of these organisms which, although temporarily incapacitated by the disinfectant, survive the disinfectant treatment and later regain their activity in spite of the continued action of the latter.—W. R. WOOLDRIDGE.

KENDALL, A. I. (1932). **Filtrable Forms of Bacteria and Their Significance.**—

J. Amer. Med. Ass. **99.** 67-68. [Paper read at 47th Annual Meeting of the Association of American Physicians].

The author suggests that media which contain unchanged protein are more suitable for the *in vitro* cultivation of filtrable stages of bacteria than those which contain protein derivatives. Such a medium is " K " medium, prepared from the intestines of hogs. He describes how a filtrable form of *Bact. typhosum* can be obtained by *in vitro* methods by the help of " K " medium.

In the discussion which followed this paper, the author's work and conclusions were disputed.—NORMAN HOLE.

MERCHANT, I. A. (1933). **A Method of Preserving Actinomyces Bovis in its " Ray Fungus " Form.**—*J. Amer. Vet. Med. Ass.* **82.** 630-631. 1 fig.

The author describes a method of preserving actinomycotic exudate in a sugar solution prepared by dissolving 1 lb. of granulated sugar in 12 oz. of distilled water to which 1 per cent. phenol is added as a preservative. Equal parts of exudate and sugar solution are thoroughly mixed and placed in a bottle which is then sealed. In this way the " ray fungus " can be kept for years and its characteristic morphology can be demonstrated.—LL. E. W. BEVAN.

DISEASES CAUSED BY PROTOZOAN PARASITES.

SCHWETZ, J. (1932). Sur la Trypanosomiase virulente du porc. [**On the Virulent Trypanosomiasis of the Pig**].—*Bull. Soc. Path. exot.* **25.** 906-911. 1 fig. [8 refs.]

From observations on pigs in the Congo, seven types of trypanosomes were encountered, *T. congolense*, *T. rodhaini* (which differs from typical *T. congolense* in possessing a free flagellum), *T. montgomeryi* (which has a greater length), *T. simiae* (which has a more folded undulating membrane) and three intermediate types.

In the early infections, types resembling *T. congolense* and *T. montgomeryi* were present, but types resembling *T. simiae* and *T. rodhaini* predominated in the acute stage of the disease preceding death. The author considers that virulent trypanosomiasis of the pig is due to a polymorphic trypanosome of the *congolense* type and suggests the name *Trypanosoma porci*.—U. F. RICHARDSON.

I. DELBREIL, J. (1932). Sur un cas de maladie du sommeil avec formol-leucogel-réaction positive, négativée par la tryparsamide. [**A Case of Sleeping Sickness with a Positive Formol-Gel Reaction converted to a Negative Reaction by Tryparsamide**].—*Bull. Mém. Soc. Méd. Hôpit. Paris.* **48.** 760-763. [3 refs.]

II. TAYLOR, A. W. (1932). **The Development of West African Strains of** *Trypanosoma gambiense* **in** *Glossina tachinoides* **under Normal Laboratory Conditions, and at Raised Temperatures.**—*Parasitology.* **24.** 401-418. 4 tables. [23 refs.]

I. No trypanosomes were detected in the patient, but the symptoms, marked auto-agglutination of red corpuscles and strong positive formol-gel reaction, indicated trypanosomiasis. Treatment with tryparsamide resulted in abatement of symptoms, cessation of auto-agglutination and delay of gelation.

II. The second article gives an account of the development of strains of *T. gambiense* in *G. tachinoides* and it is shown that the first or intestinal phase of development is passed within the extraperitrophic space. Twenty-six strains

of *T. gambiense* were used and all were transmissible. Increased temperature resulted in a marked and constant increase in the number of tsetse which became infected. In one case flies kept at 37°C. showed an infection rate of 77·8 per cent. whilst control flies at room temperature showed rates varying from 0 to 10·5 per cent.—U. F. RICHARDSON.

MONTESTRUC, E. (1932). Infection et réinfection trypaniques chez un Européen (auto-observation). [**The Infection and Reinfection of a European by Trypanosomes (Author's Observation on Self)**].—*Bull. Soc. Path. exot.* **25.** 664-668.

Trypanosomes were detected accidentally early in 1927 and courses of treatment with tryparsamide were given in 1927, 1928, and 1929. In 1931 no trypanosomes could be detected. In 1932, after a trip on the Niger and exposure to the attacks of *Glossina tachinoides*, a reappearance of trypanosomes occurred which was believed to have been due to a reinfection.—U. F. RICHARDSON.

ADLER, S., & THEODOR, O. (1932). **Investigations on Mediterranean Kala Azar. VI.—Canine Visceral Leishmaniasis.**—*Proc. Roy. Soc. London. Ser. B.* **110.** 402-412. 7 figs. on 2 plates. [20 refs.]

Working in Malta the authors found that, of 100 stray dogs examined between June and October, 1931, 11 were infected with leishmaniasis. In the course of their investigations it was determined that the examination of spleen smears was more satisfactory for diagnostic purposes than the examination of material obtained by liver puncture. A small incision was made in the abdominal wall, and a piece of the spleen was cut off for the purpose of making the smears. Nine of the dogs shewed depilation and seborrhoea and four were emaciated. In four the spleen was enlarged, in five normal, and in two fibrous. Plasma cells were present in the films in considerable numbers even when the parasite was scantily present. Parasites were fewest in the fibrous spleens.

Sections of the affected skins showed infiltrations of large and small macrophages round the hair follicles, but infected macrophages could be found apart from the infiltrated areas, without any apparent reaction around them. The epidermis was normal.

In the more advanced stages the dermis is more cellular than normal. This condition cannot be confused with the skin changes produced by *L. tropica* where there is always dense infiltration with macrophages and this is not confined to the hair follicles. In this condition, the presence of infected macrophages in the dermis always leads to infiltration with plasma cells and small round cells. The differentiation between the skin changes in canine visceral leishmaniasis and those of canine cutaneous leishmaniasis is of importance in such places as Turkestan, for the carriers of oriental sore and sand-flies of the *major* group are common. This probably accounts for the fact that cutaneous and visceral forms of the disease occur both in man and dogs there. Mixed infections appear to occur in dogs.

Experiments with *Phlebotomus perniciosus* on naturally infected dogs with skin lesions showed a high percentage of infected flies. In experiments with infantile kala-azar the percentage of infected flies is always much lower—in fact negligible—as compared with the experiments with dogs.

It is worthy of note that the typical skin lesion has never been produced in dogs by experimental methods, and it is probable that the explanation of this lies in the fact that the skin has not been selected as the path for infection in such experiments.

Canine kala-azar is a seasonal disease which shows no marked annual variations.

The cases reach a maximum in March or April, when infantile kala-azar is at its height, and two months before the beginning of the sand-fly season. After September the incidence falls, and by November the cases are dead or recovered. If sand-flies are transmitters the period of incubation must be five to six months.

—A. Leslie Sheather.

Emmerson, M. A. (1932). **Trichomoniasis in Cattle. A Preliminary Report.**—*J. Amer. Vet. Med. Ass.* **81.** 636-640. [7 refs.]

This paper records two cases of vaginal trichomoniasis in sterile cows in America and gives a brief review of the literature dealing with the condition. The trichomonads were detected by examination of fresh vaginal smears ; the author points out that they do not stain well with ordinary dyes and that this may account for the failure to recognize the condition earlier in America. The organisms are described as slightly larger than a leucocyte, with three anterior flagella and an undulating membrane, to the border of which is attached a trailing flagellum.

The symptoms shown by the cows were the presence of dried mucus and faeces on the tails and, when lying down, the exudation of purulent material from the vulva. This discharge is said to be peculiar to trichomoniasis and to consist of slightly cloudy mucus in which are incorporated clumps of cream-coloured pus. All the infected cows were suffering from granular vaginitis.

—U. F. Richardson.

Millauer, K. (1932). Die Piroplasmose des Rindes und ihre Behandlung mit Trypanblau. [**Piroplasmosis of Cattle and its Treatment with Trypan Blue**].—*Oesterr. Tierarzt.* **5.** 187-188.

Stylianopoulos, & Ananiadès. (1932). Contribution à l'étude des piroplasmoses en Grèce. [**A Contribution to the Study of Piroplasmosis in Greece**].—*Bull. Soc. Path. exot.* **25.** 889-892.

In the first paper the author describes outbreaks of red water due to *Babesia bigemina* which commonly occur in his practice when stock are put out to pasture in the spring. He records excellent results from treatment with trypan blue used subcutaneously in doses varying from 100 to 200 c.c. of a 1 per cent. solution. He prefers subcutaneous inoculation as, if emergency slaughter becomes necessary, there is not such a wide discolouration of flesh as with intravenous or intramuscular inoculation. He records a case where 17 cattle were inoculated with trypan blue 15 days after being placed on infected pasture and four animals were left as controls. The inoculated animals remained healthy but the four controls contracted red water.

The second paper discusses the importance of piroplasmosis in Greece and points out that it is the chief obstacle to the improvement of stock by the introduction of sires. The authors record an outbreak of piroplasmosis due to *Babesia caballi* which occurred in horses imported from Hungary. There was a sudden rise of temperature to 40°C. ; the mucous membranes were yellow and showed petechiae ; the digestion was not much affected and the appetite was never entirely lost ; the urine was dark in all cases and, in 25 per cent. of cases, showed haemoglobin. The parasites were not numerous in slides ; pear forms predominated and anaplasma forms were also detected. Trypan blue was used in treatment, 1 g. being given intravenously, but three animals died out of the ten treated.

—U. F. Richardson.

Elmanoff, N. W. (1933). Infektionsversuche an Rindern mit dem Virus der nordischen Piroplasmose (Babesiella bovis). [**Experimental Infection**

of Cattle with the Organism of Northern Piroplasmosis (*Babesia* [*Babesiella*] *bovis*)].—*Zschr. Infektkr. Haust.* **43.** 89-92. 1 table.

On account of the heavy losses among cattle due to piroplasmosis, the Veterinary Laboratory at Nowgorod is now making experiments on immunization. The experiments were carried out on 7 calves from 4 to 13 months old and 10 cows ranging from 3 to 11 years of age. Five of the calves were infected by the injection of 1 to 10 c.c. of blood obtained from cattle during the height of a natural attack and the remaining 2 calves by the inoculation of blood from recovered animals. Only 3 of the calves reacted ; there was a slight rise of temperature and parasites were present in the blood. Of the cows, 6 were inoculated with 1 to 10 c.c. of blood from recovered calves, 1 with blood from cattle obtained during an attack and 3 by infestation with infected larvae and nymphs [of ticks ?] Eight of the cows developed clinical symptoms and showed marked elevations of temperature.

The animals were given a second inoculation after intervals ranging from four months to two years and five months. The reinfections were performed with large quantities (up to 50 c.c.) of highly virulent blood or by infestation with large numbers (up to 4,000) of infected larvae and nymphs. Most of the cattle thus inoculated remained free from clinical symptoms. Fever was observed in only one calf and three cows. A few parasites were observed in the blood of two cows.

The author draws no special conclusions from these results, but regards them as a basis for further experiments.—R. Wetzel (Hanover).

Regendanz, P. (1932). Untersuchungen über das Hundepiroplasma (*Babesia canis*) in der Zecke. [**Research on the Canine Piroplasm** (*Babesia canis*) **in the Tick**].—*Deuts. tierärztl. Wschr.* **40.** 745-748. 1 fig. [7 refs.]

An account is given of the development of *B. canis* in *Dermacentor reticulatus*. It was found that *Rhipicephalus sanguineus* would not transmit the strain of *B. canis* concerned. *D. reticulatus* is a three host tick ; larvae feed on small mammals e.g. hedgehog ; nymphs feed on small mammals, but are sometimes found on dogs ; the adult feeds on the dog.

The piroplasms leave the red corpuscles in the intestine of the tick and the majority are destroyed. The survivors become elongated and penetrate the epithelial cells where they again become rounded and commence to multiply rapidly by binary fission. Small, round forms 2 to 4μ in diameter are produced and as many as 1,000 may be found in one cell. The parasites again elongate and become motile, penetrate the intestinal basal membrane, wander to the ovary and enter the eggs. This stage of development occurs between the falling of the tick from the host and the commencement of egg laying. Before the larvae suck blood the parasites are found in very small numbers in the epithelial cells of the intestine but, with engorgement, multiplication occurs and other organs are invaded. Sometimes even the salivary glands are invaded at this stage and the glands of nymphs may be infected, but usually this does not occur till the adult stage of development is reached. In the unfed adult only a few parasites are found in the salivary gland cells, but when the first feed is taken these multiply and later thousands may be found in one cell. The intracellular forms are round and 1 to 2μ in diameter, but these again elongate to 1 to 3μ long and wander into the lumen of the ducts of the gland. As multiplication in the gland only begins with the first feed of blood and it takes three to four days before the elongated infective forms are produced, the tick is not infective for three or four days after attachment. The incubation period in the dog is three days so that blood forms begin to appear six days after attachment. As the female tick is attached for eight to twelve days

it reinfects itself from the dog.

There was no evidence of any sexual cycle of development in the tick.

Emulsions of ticks inoculated into dogs were found not to be infective till invasion of the salivary glands had occurred.

It was found that engorged female ticks wintered at 5°C. would transmit the parasites to their descendants.—U. F. RICHARDSON.

DÉBONÉRA, G. (1933). La piroplasmose des poules en Grèce. [**Piroplasmosis of Fowls in Greece**].—*Bull. Soc. Path. exot.* **26.** 14-15. [1 ref.]

STYLIANOPOULOS, M., & ANANIADÈS, B. (1933). Contribution à l'étude des piroplasmes en Grèce : Nuttaliose du cheval. [**A Contribution to the Study of Piroplasms in Greece : Equine Nuttaliasis**].—*Ibid.* 15-18. [2 refs.]

The first paper records investigations into an enzootic disease of fowls in Athens in which *Aegyptianella pullorum* was demonstrated. Subinoculation allowed the disease to be transmitted in series. The incubation period was from 12 to 15 days and the symptoms were anaemia and diarrhoea. Adult fowls recovered, but 50 per cent. of chicks under three months old died.

The second paper records the prevalence of *Babesia equi* infection in horses in Greece. The disease is usually noticed as a relapse which is provoked by such causes as an attack of piroplasmosis due to *B. caballi* or vaccination against anthrax.

The symptoms were an irregular temperature, rarely exceeding 40°C., depression, anaemia, yellow colouration of visible mucous membranes and haemoglobinuria. The parasites appeared as small rings, pears or cross forms whilst rare anaplasma forms were seen at the beginning or end of the attacks.

The disease was rarely fatal. Urotropine, stibosan and trypaflavine were tried in treatment, but none of them appeared to affect the parasite.

—U. F. RICHARDSON.

REES, C. W. (1932). **The Experimental Transmission of Anaplasmosis by Dermacentor variabilis.**—*Science.* **75.** 318-320. [1 ref.]

It is pointed out that, in the United States, anaplasmosis extends not only beyond the zones within which piroplasmosis is now confined, but also beyond the original range of enzootic bovine piroplasmosis and that, if anaplasmosis is tick-borne throughout its range, two other species of ticks must be involved.

The paper describes controlled experiments resulting in the transmission of anaplasmosis by *D. variabilis* between the stages of larvae to nymphs and nymphs to adults and the failure to transmit between the adult to the larval stages.

D. variabilis is a widespread tick and, as it has also been recently incriminated in the transmission of Rocky Mountain spotted fever, it will require further careful study as a tick of major importance in America.—U. F. RICHARDSON.

ELDIN, S. M. (1932). **The Parasitic Entity of Aegyptianella Pullorum (Carpano 1928).**—*Arch. Schiffs- u. Trop.-hyg.* **36.** 400-407. [32 refs.]

The author endeavours to refute the claim of KNOWLES and his co-workers that Balfour bodies can be produced in fowls by the administration of phenylhydrazine and that they must therefore be regarded as bodies derived from the nucleus and not as specific parasites related to the Babesiidae. He records the results of daily intramuscular injections of phenylhydrazine and is of the opinion that the inclusion bodies produced do not resemble the Balfour body in that recognizable nuclear damage has occurred ; either a connection exists between the nucleus and the inclusion body, or the nucleus is reduced in size. The inclusion bodies

produced by phenylhydrazine are rarely in the ring form which is the commonest form assumed by the Balfour body (*Aegyptianella pullorum*).—U. F. RICHARDSON.

I. NONO, A. M. (1932). **Avian Malaria Studies. VI. Susceptibility of *Lutzia fuscana* (Wiedemann) Edwards to Avian Malaria.**—*Philippine J. Sci.* **49.** 225-228. 1 plate. [1 ref.]

II. JIROVEC, O., & CERNY, W. (1932). Die Ergebnisse der Nuklealreaktion bei Vogelmalaria. [**The Result of the Nucleal Reaction in Avian Malaria**]. —*Zlb. Bakt. I. (Orig.).* **126.** 181-184. 6 figs. [4 refs.]

III. VON BREINDL, W., & JIROVEC, O. (1932). Einige Bemerkungen über die Nuklealreaktion bei Laverania malariae und Proteosoma praecox. [**Some Notes on the Nucleal Reaction in *Laverania malariae* and *Proteosoma praecox***].—*Ibid.* 184-186. 3 figs.

I. In two cases oocysts of *Plasmodium cathemerium* were found in *Lutzia fuscana* seven days after feeding on heavily infected canaries. In one case 11 oocysts were found in the intestine of *L. fuscana* eight and a half days after feeding on birds heavily infected with *P. capistrani.*

II & III. These two articles deal with the question of the exhibition of the nucleal reaction by the nuclei of *Proteosoma praecox* [*Plasmodium relictum*] and malarial parasites. PAWAN had reported that in the cases of *P. falciparum* and *P. vivax* the nuclei did not give the Feulgen reaction [red colouration given with sulphuric acid fuchsin by bodies containing thymonucleic acid after they have been submitted to partial hydrolysis] and must, therefore, be deficient in thymonucleic acid. Jirovec and Cerny report that in *P. relictum* the reaction is not given by the nuclei of gametocytes or young schizonts, in which the chromatin is scanty and very finely granular, but is given by the nuclei of mature schizonts and merozoites. Breindl and Jirovec find that in the case of *Laverania malariae* [*P. malariae*] the Feulgen reaction is given by the nuclei of the schizonts and merozoites, examined in brain sections.—U. F. RICHARDSON.

D'HERELLE, F. (1932). **Clover and Malaria.**—*Amer. J. Hyg.* **16.** 609-617. [8 refs.]

The author points out that the theory of the antimalarial action of clover (species of *Melilotus*) is not that it prevents the development of anophelines, but that it causes an attenuation of the parasite which becomes non-pathogenic to man. He thinks that the prevalence of malaria in districts planted with alfalfa three years previously, reported by STRATMAN-THOMAS, might be due to chronic malarial infection and that a truer picture of the influence of alfalfa might be obtained by comparing the malarial index of children born since the flowering of the first crop with the index of the rest of the population. He points out that, in the Argentine, cattle are not stalled or kept in the vicinity of houses and that the marked absence of malaria, in spite of the prevalence of anophelines, cannot be ascribed to the animal factor in this case—the preference of the mosquitoes for feeding on cattle.—U. F. RICHARDSON.

RHEES, Henrietta S. (1932). **Spirella sp.? Isolated from the Guinea Pig.**—*J. Bact.* **23.** 211-220. 4 figs. on 1 plate. [11 refs.]

Medium made from a normal guinea pig was inoculated with heart blood from a guinea pig suffering from rat bite fever and on incubation at 37·5°C. a spirochaete resembling but differing from *Spirochaeta morsus-muris* developed in tubes containing Douglas broth with 0·1 per cent. agar. No control medium was incubated. The spirochaete did not grow in human, horse, rabbit or guinea pig serum.—U. F. RICHARDSON.

YAKIMOFF, W. (1933). Les corps de Balfour au Caucase. **[Balfour Bodies in the Caucasus].**—*Bull. Soc. Path. exot.* **26.** 606.

In 1908 Balfour, in the Anglo-Egyptian Sudan, found in chickens suffering from spirochaetosis certain inclusions in the red blood cells which were described as " after phase bodies " and regarded as a resting stage of the *Spirochaeta granulosa penetrans*. The exact nature of these inclusions, which have been encountered by other observers, has not been determined. Some have regarded them as particles of the chromatin nucleus, others have considered that they belong to the Babesiidae. Yakimoff has recently discovered these bodies in a fowl from Leningrad infected with spirochaetosis by *Argas persicus* collected from the Transcaucas and Northern Caucasus. This fowl recovered as the result of treatment, but three weeks later again appeared sick. In its blood " Balfour bodies " were found increasing in number from 3 per cent. on the first day to 50 per cent. on the day of its death.

—LL. E. W. BEVAN.

DISEASES CAUSED BY VIRUSES.

DOHERTY, A. G. (1932). **African Horse Sickness. Evidence of Natural Resistance under Certain Conditions.**—*Vet. Rec.* **12.** 1131-1132.

This note deals with the practical difficulties experienced in preventing horse sickness and the possibility of promoting recovery if infection is detected before the characteristic symptoms appear. The author claims that recovery depends upon the health of the animal before infection and the detection of the initial rise of temperature within a few hours, so that energy may be conserved by complete rest. The daily use of the thermometer is therefore indicated. [It may be of interest to point out that in Southern Rhodesia, where at one time as many as 75 per cent. of all equines died annually of this disease, neither condition nor rest were sufficient to save them when infected with a natural virus, and that recoveries such as those described by Doherty were only met with in horses and mules inoculated with an attenuated virus, or in partially immune subjects].—LL. E. W. BEVAN.

DU TOIT, P. J., & NEITZ, W. O. (1932). **The Immunization of Mules, with Formalized Horse-sickness Virus.**—*18th Rep. Direct. Vet. Serv. & Anim. Indust. Union of S. Africa.* Part I. pp. 35-47. 7 tables. [2 refs.]

The routine method of inoculating mules against horse sickness in South Africa consists of a simultaneous injection of 5 c.c. of O virus and 300 c.c. of immune serum. In the course of some 70,000 immunizations, a mortality of 3 per cent. has been encountered. The use of formolized vaccine is being investigated with a view to reducing the cost of immunization and to simplify the process.

Spleens infected with O virus were minced and diluted with normal saline to make a 20 per cent. emulsion and formol was then added to the required concentration. Concentrations tested ranged from 1 : 1,000 to 1 : 4,000. The dose of emulsion was always 30 c.c. Subcutaneous single dosage, double dosage at 14-day intervals and double dosage with increasing strengths of vaccine were tried. Before use the vaccine was incubated at 37°C. for three days and then stored at room temperature for 20 days. After varying periods, the immunity of the recipients was tested by injections of 5 c.c. of virulent O virus.

The most satisfactory results followed the use of a dose of vaccine containing 1 : 2,000 parts of formaldehyde followed after 14 days by a dose containing only 1 : 3,000 parts. The procedure gave an immunity and a mortality very similar to the virus-antiserum inoculation.

This method is still in the experimental stage, but shows considerable promise from the economic viewpoint.—E. J. PULLINGER.

CERNOVSKY, J. (1932). O tlumení moru vepro. [**On the Eradication of Swine Fever**].—*Zverol. Rozpravy.* **6.** 265-273 and 277-285. [14 refs.]

During the last two years swine fever has spread over large districts of Czechoslovakia. The author discusses the aetiology, diagnosis and control of the disease, basing the results on his own experiments and on those of other authors. He advises that infected or suspected animals should be slaughtered. He considers that it is useful to give serum alone to pigs on the second or third day of infection, giving serum simultaneous virus inoculation later when the infection has been eliminated.

Formalinized vaccine which has been used with success in Japan, can be employed for dealing with sporadic cases.—E. PRIBYL (BRNO).

ZOFIJEVSKY, V. (1933). Teoretické a praktické príspěvky k lécebnému ockování serem proti moru vepru. [**Theoretical and Practical Contributions on Serum-Alone Inoculation against Swine Fever**].—*Zverol. Obzor.* **26.** 6-14. [6 refs.]

In this paper the author, Director of the Serotherapeutical Institute of Jugoslavia, discusses the theoretical basis and his practical experiences with serum-alone against swine fever. By the use of serum inoculation given one to two days after the animals refuse food almost all of them can be saved. When the serum inoculation is done on the third day, about 50 per cent. of pigs can be saved, but, after this interval, it is useless. The serum-alone method of inoculation cannot be used successfully for animals on premises that are permanently infected.

E. PRIBYL (BRNO).

CAIN, C. B., & SEIFRIED, O. (1932). **Histological Studies on Hog Cholera.**—*J. Amer. Vet. Med. Ass.* **80.** 225-228.

SEIFRIED, O. (1932). Die Ausbreitung der "encephalitischen Reaktion" bei Schweinepest und deren Beziehungen zur Hundestaupe-Encephalitis. [**The Spread of the Encephalitic Reaction in Swine Fever and its Relation to Distemper Encephalitis**].—*Arch. wiss. prakt. Tierhlk.* **64.** 432-443. 6 figs. [12 refs.]

SEIFRIED, O., & CAIN, C. B. (1932). **Histological Studies on Hog Cholera. II. Lesions of the Vascular System. III. Lesions in Various Organs.**—*J. Exp. Med.* **56.** 345-349 and 351-362. 1 text fig., 13 figs. on 6 plates. [30 refs.]

SEIFRIED, O. (1932). Zur Histologie und histologischen Diagnostik der Virusschweinepest. [**The Histology and Histological Diagnosis of Swine Fever**].—*Münch. tierärztl. Wschr.* **83.** 244-249. 6 figs. on 1 plate. [18 refs.]

The above papers are a series dealing with the histology and pathology of swine fever (hog cholera) and are important from the point of view of quick and reliable diagnosis of the disease. The first paper is a preliminary report of the lesions in the lymph nodes and kidneys which are described in full in the succeeding papers. The second paper deals with the encephalitis of swine fever and a comparison with that of distemper. It is shown that the inflammatory process in swine fever occupies a particular localization in the central nervous system, that the grey and white matter are equally attacked, and that there is a particular involvement of the brain in the neighbourhood of the ventricles. The spread of the lesions in the mid brain, the cerebellum, optic thalamus and hind brain shows

great similarity to that of distemper encephalitis.

[Reference should also be made to SEIFRIED. (1931). "Histological Studies on Hog Cholera. I. Lesions in the Central Nervous System."—*J. Exp. Med.* **53.** 277-287].

The third paper deals with the vascular lesions. It is shown that the virus, after entering the blood stream, causes pronounced changes of the endothelial cells of the capillaries and smaller arteries. Larger arteries and veins are less frequently involved. The lesions consist of swelling and modification of the endothelium together with retrogressive changes. The magnitude of the vascular lesions depends upon the virulence of the virus and there are no fundamental differences between the lesions of pure swine fever cases and those associated with secondary bacterial invasion. The vascular lesions constitute a principal feature of the histopathology of swine fever and offer an explanation for the haemorrhages and foci of necrosis that are so characteristic of the disease. They were most marked in the lymph nodes, spleen and kidney.

The fourth paper describes the lesions in the viscera which are considered to result from the vascular lesions. The main changes are haemorrhages and foci of necrosis in the lymph nodes, anaemic infarcts in the spleen caused by the primary vascular lesion in the follicular arteries, and aplasia of the lymph follicles. The virus evidently paralyses lymphopoiesis in the early stages of the disease. In the kidneys, haemorrhages and degenerative lesions in the glomeruli and tubules with reactive inflammatory processes are observed.

The fifth paper is simply a brief summary of the findings of all the above papers.—J. R. M. INNES.

HOUCK, U. G. (1933). **The Feeder-Pig Problem.**—*J. Amer. Vet. Med. Ass.* **82.** 509-514. 1 table.

This communication refers mainly to the traffic, intra- and interstate, in store pigs as a channel by which the infection of hog-cholera is spread. The store pig (feeder-pig) trade is a necessity owing to the fact that some farmers find it more expedient to breed pigs than to fatten them, while others find the reverse procedure more convenient. Recent extension of transport facilities has naturally caused a greater and wider movement of young pigs and with this an increased risk of the spread of infection. Methods of preventing the spread of infection are discussed. Artificial immunization in the early days of its adoption was not reliable, virus of low virulence and serum of questionable potency often being used. The passage by Congress of the Virus-Serum-Toxin Law in 1913, requiring producers of these biological products to be licensed, was a necessity.

A further safeguard was provided by a regulation requiring the immunization of all store pigs passing through public stockyards. Approximately seven million pigs have been so treated during the period 1915-1932 with, apparently, successful results. The author concludes that for the prevention of the spread of infection and reduction in mortality, proper immunization is the most hopeful resource.

—R. G. LINTON.

—. (1932). Enquête sur la rage. Allemagne. Renseignements transmis par le Gouvernement du Reich sur l'état de la rage pendant l'année 1931. [**Rabies Enquiry, Germany. Information supplied by the Reichsgesundheitsamt on the Position with Regard to Rabies during 1931**].—*Bull. Off. internat. Epiz.* **6.** 201-203. 1 table, 2 graphs.

The statistics show a certain increase in the number of cases occurring during 1931 as compared with 1930. Two graphs are annexed, one showing the variation

in the number of cases of rabies, and the other the variation in the number of cases of suspected rabies during the course of the year. A list is given of the affected states as well as those which were free from rabies or suspected rabies. During the period under survey the epizootic was manifest chiefly in the districts near the Polish and Czechoslovakian frontiers. No preventive vaccination of animals was carried out. The disease is stated to have been successfully checked by application of the law of 26th June, 1909, which provides measures for the control of such epizootics.—[(1909). *Ministerialblatt. d. Verw. f. Landw.* 252]. No cases of human rabies had been recorded within the time limit of the report.

—I. A. GALLOWAY.

REMLINGER, P., & BAILLY, J. (1932). Etudes sur la rage. (Deuxième mémoire). [**Studies on Rabies—Second Memoir**].—*Ann. Inst. Pasteur.* **49.** 665-735. 2 tables. [32 refs.]

The authors describe in detail the method practised in Morocco for the preparation of anti-rabic vaccine for use on dogs. The vaccine consists of the brains of rabbits or dogs attenuated by immersion in sulphuric ether. Two doses of vaccine, each of 20 c.c., are given at an interval of 24 hours. Since 1928, some thousands of dogs have been inoculated with this vaccine in Morocco with excellent results. The duration of the protection conferred by the vaccine has not yet been ascertained, but from analogy with anti-rabic vaccination in man, it is probably about three years. Pending more precise information on this point, annual vaccination as a precautionary measure is recommended.

From 1928 to 1932 other species of animals (horses, mules, pigs, cattle, monkeys, donkeys and cats) have also been inoculated with the ether-vaccine, mostly on account of bites from rabid dogs and, with the exception of one cow which was severely bitten, none developed the disease.

An acute ascending paralysis (Landry's paralysis) in animals is a symptom both of " street rabies " and of infection with the fixed virus, but until recent times there was no record of an epidemic of rabies in man characterized exclusively by paralysis.

WESTON HURST and PAWAN described an outbeak of rabies which occurred in 1929 among the native population of Trinidad characterized by an acute ascending paralysis [see this *Bulletin.* **1.** 285]. Remlinger and Bailly confirmed that the Trinidad virus, received from WESTON HURST, was a rabies virus.

In a series of experiments the authors showed that experimentally induced alcoholism has no adverse influence on anti-rabic vaccination as has generally been considered the case since the experiments of DELÉARDE (1897).

In experiments with tortoises it was found that rabies virus can persist unattenuated in the brain for as long as 350 days.

In experiments made on 7 guinea pigs, 4 cats and a bitch to ascertain if rabies virus was excreted with the milk, only two positive results were obtained, which confirm previous experience that rabies virus is only exceptionally present in milk.—T. M. DOYLE.

VAUCEL, M., & SALEUN, G. (1932). Rage canine en Afrique Equatoriale Française. [**Rabies in French Equatorial Africa**].—*Bull. Soc. Path. exot.* **25.** 1018-1021. 3 tables. [3 refs.]

From October, 1931, to August, 1932, three dogs naturally infected with rabies died while under observation at the Pasteur Institute, Brazzaville, French Equatorial Africa.

The authors carried out cross-immunity tests with two of the strains of

virus isolated and a strain of fixed virus. Both African strains proved to be immunologically indistinguishable from the fixed virus. The three African viruses appeared to be biologically typical rabies strains. No case of rabies in man has yet been reported from French Equatorial Africa.—T. M. DOYLE.

LAIDLAW, P. P., & DUNKIN, G. W. (1932). **Distemper.**—*Lancet.* **223.** 1457.

The authors, in this letter to the editor, put forward a considered opinion to explain the outbreak of distemper in their "compound." They express the opinion that the virus content of the liver is very variable and may sometimes be quite small and they do not recommend the use of this organ for vaccine production as a routine.—G. W. DUNKIN.

URBAIN, A., LASSABLIÈRE, P., & VOIGNIER, E. (1933). Sur l'immunisation des Chats contre la gastro-entérite infectieuse par un vaccin formolé. [**The Immunization of Cats against Infectious Gastro-Enteritis with a Formolized Vaccine**].—*C. R. Soc. Biol. Paris.* **112.** 247-249. [6 refs.]

The authors recall that, in a previous article, they had confirmed the view that gastro-enteritis of cats is caused by a filtrable virus. They found the virus principally in the blood and spleen of animals which had died of the disease and also in the saliva, urine and faecal excretion.

The method of vaccination adopted by the authors was the formolization of spleen emulsion of animals in the last stages of the disease and, after cultures had established the sterility of the product, the emulsion was put up in ampoules of 2 c.c. and placed in the cold room.

It is stated that an injection of 2 c.c. subcutaneously into a cat causes no disturbance other than a redness and little oedema at the site of inoculation. In one experiment three kittens each received 2 c.c. of virus on two occasions at an interval of five days, and ten days later these kittens, together with an uninoculated control, were put in contact with infected animals. The control animal sickened and died on the 11th day and the vaccinated animals remained healthy. In a second experiment four kittens received vaccine as in the previous experiment. They were then fed for two days, as were two control kittens, with milk and a paste containing saliva and urine from an infected animal which had died of the disease. The control kittens developed a gastro-enteritis on the 9th and 10th days respectively, whereas the vaccinated animals remained perfectly healthy.

It is, therefore, concluded that it is possible to vaccinate kittens with formolized spleen emulsion prepared in the manner indicated.—G. W. DUNKIN.

RECORDS, E., & VAWTER, L. R. (1933). **Equine Encephalomyelitis Antiserum.**—*J. Amer. Vet. Med. Ass.* **82.** 608-616. [10 refs.]

An extensive outbreak of encephalomyelitis among horses and mules, spreading from California northward through Oregon into Dakota and Texas, rendered it necessary to devise a method of dealing with the disease by immunization. The results to date are given, but no claim is made that the method described is perfect. The virus was obtained from acute, typical, uncomplicated cases in horses and was maintained and propagated by inoculation into the brains of guinea pigs and horses. The technique is described. Horses used for the purpose had to be tested for glanders and be free from infectious anaemia. This also applied to horses used for serum production. At a certain stage in the disease the infected horse was destroyed by shooting and the cerebrum, cerebellum and medulla were removed and placed in a glycerin and phosphate buffer solution, pH 7·4. From this a so-called standard virus emulsion was prepared, which was used

for hyperimmunizing horses from which eventually immune-serum was collected. The serum, after filtration and titration upon guinea pigs, was recommended in doses of 250 c.c. for the treatment of horses. It was also thought to confer some degree of passive immunity.—LL. E. W. BEVAN.

I. SABIN, A. B. (1932). **Experiments on the Purification and Concentration of the Virus of Poliomyelitis.**—*J. Exp. Med.* **56.** 307-317. 4 tables, 1 chart. [8 refs.]

II. PAUL, J. R., & TRASK, J. D. (1932). **The Detection of Poliomyelitis Virus in So-Called Abortive Types of the Disease.**—*Ibid.* 319-343. 7 figs., 1 plate, 2 tables. [18 refs.]

I. The author adopted methods very similar to those of WILLSTÄTER and his co-workers on enzymes and confirmed ROAD's observation that a colloidal suspension (aluminium hydroxide) when mixed with a poliomyelitis virus suspension adsorbed and inactivated the virus. This action took place within an acid pH range of 5·5 to 7. It was also shown that adsorption and inactivation are reversible and that virus capable of again producing typical poliomyelitis on inoculation in monkeys could be liberated by changing the pH to the alkaline side.

Virus suspensions with a greater degree of purity were obtained by removing extractable organic substances—these being freed by washing the alumina-virus-complex with M 5 sodium chloride—M 15 potassium dihydrogen phosphate. More concentrated suspensions were obtained by distillation *in vacuo.*

II. The authors describe experiments on the isolation of poliomyelitis virus from the throats of two patients suffering from a characteristic minor illness or so-called abortive poliomyelitis. They state that such cases, occurring in association with poliomyelitis cases and outnumbering them many times, play an important role in the spread of the disease.—D. R. WILSON.

GIBBS, C. S. (1932). **Chronic Carriers of Infectious Laryngotracheitis.**—*J. Amer. Vet. Med. Ass.* **81.** 651-654. 3 figs., 2 tables. [3 refs.]

The author studied 21 chronic carriers of laryngotracheitis and found that the length of time the virus persisted in sufficient quantity in the trachea to infect susceptible chickens by means of intratracheal swabs varied from 37 to more than 467 days ; at the end of this period two fowls were still carrying the virus in the trachea.

Four of the longest and most persistent carriers had laryngotracheal râles. Definite areas of inflammation, some of which were covered with pseudomembranes, were found in the larynges and tracheae of these birds.

The presence or absence of the laryngotracheal râles appeared to depend upon the size of the areas of pseudomembranes and the degree of inflammation in the larynx and the trachea. The site of the lesions was important as, when in the larynx, they were most likely to interfere with respiration and produce râles. Gibbs concluded that observation of laryngotracheal râles is not a reliable means of detecting chronic carriers.—T. M. DOYLE.

TIETZ, G. (1932). Ueber die Empfänglichkeit verschiedener Vogelarten für eine Infektion mit originärem Hühner-und Taubenpockenvirus. [**Susceptibility of Various Species of Birds to Infection with Original Fowl and Pigeon Pox Virus**].—*Arch. wiss. prakt. Tierhlk.* **65.** 244-255. [31 refs.]

The author reviews the literature on spontaneous fowl pox infection in domestic and wild fowl. All grain-eating birds appear to be susceptible and birds of prey have also been found infected. Fowl pox in the partridge is benign.

He tested the susceptibility to original fowl and pigeon pox virus (using three monopathogenic fowl pox and two monopathogenic pigeon pox viruses), of various passerine birds, crows, ducks, geese, guinea fowl and turkeys. The following are his results :—passerine birds (canaries, siskins, linnets, ? finches, sparrows, starlings and blackbirds), geese and ducks were found insusceptible ; turkeys and guinea fowl were susceptible to fowl, but not to pigeon, pox virus ; crows were susceptible to fowl and to pigeon pox virus.—J. E.

RIVERS, T. M., & WARD, S. M. (1933). **Observations on the Cultivation of Vaccine Virus in Lifeless Media.**—*J. Exp. Med.* **57.** 57-63. 7 tables. [11 refs.]

The authors repeated the work of EAGLES and MCCLEAN [see this *Bulletin.* **1.** 220.] on the cultivation of vaccine virus in a cell-free medium.

As a preliminary to this experiment, Rivers and Ward successfully cultivated the virus in media containing rabbit spleen and rabbit kidney ; they have repeatedly cultivated the virus in media containing testicle and chick embryo so further work on these tissues was considered to be unnecessary.

Nine unsuccessful attempts were made to cultivate the virus in media containing concentrated or dilute kidney extract. Similarly attempts to cultivate the virus in media containing extracts of rabbit spleen, rabbit testicle and chick embryo were unsuccessful. " K " medium was tried, but there was no evidence that it was capable of supporting the multiplication of the virus.

The findings of Rivers and Ward confirm those of MAITLAND, LAING and LYTH, and are opposed to those of EAGLES and MCCLEAN who claim to have successfully cultivated vaccine virus in a cell-free medium.—T. M. DOYLE.

I. TANIGUCHI, T., HOSOKAWA, H., KUGA, S., & FURMURA, R. (1932). Etude sur le virus de la variole. [**A Study of Small-Pox Virus**].—*C. R. Soc. Biol. Paris.* **111.** 703-706. 2 figs.

II. SMITH, WILSON. (1932). **A Heat-Stable Precipitating Substance Extracted from Vaccinia Virus.**—*Brit. J. Exp. Path.* **13.** 434-446. 4 tables. [13 refs.]

III. TANG, F. F. (1932). **Adsorption Experiments with the Virus of Vaccinia.**—*J. Bact.* **24.** 133-143. 8 tables. [10 refs.]

I. The authors give details of an improved method for the staining of Paschen bodies. They consider that there is more than one type of elementary body, as those described by PASCHEN are different from the bodies that they have observed. They do not agree with PASCHEN that elementary bodies can be demonstrated by the silver method of Levaditi in the liver, spleen and kidneys of rabbits exhibiting generalized vaccinia.

II. Wilson Smith obtained extracts of testicular vaccinia virus which gave a specific precipitating reaction with immune sera. The precipitating substance withstood repeated boiling. The intradermal inoculation of the extract into previously vaccinated human beings elicited allergic skin reactions.

III. Tang carried out a series of adsorption experiments on vaccinia virus suspended in salt solution and in hormone broth. He showed that the virus could be readily adsorbed from the saline suspension, but not from the hormone broth.

Pyrex was less adsorptive than ordinary glass fragments and sand was found to be practically non-adsorptive.—T. M. DOYLE.

PERDRAU, J. R., & TODD, C. (1933). **The Photodynamic Action of Methylene Blue on Bacteriophage.**—*Proc. Roy. Soc. London. Ser. B.* **112.** 277-287. 6 tables. [9 refs.]

PERDRAU, J. R., & TODD, C. (1933). **The Photodynamic Action of Methylene Blue on Certain Viruses.**—*Ibid.* 288-298. 3 tables. [5 refs.]

The authors have repeated and extended the observation of SCHULTZ and KRUEGER [(1928). *Proc. Soc. Exp. Biol. New York.* **26.** 100.] that staphylococcus bacteriophage is remarkably sensitive to the action of methylene blue. The role played by light in this inactivation has also been confirmed.

Broth filtrates of bacteriophage were mixed in the dark with varying dilutions of methylene blue (1 : 10,000, 1 : 100,000 and 1 : 1,000,000) and were exposed to a 100-c.p. pointolite for different lengths of time. A drop of phage was then added to one drop of the corresponding culture and the mixture plated out to determine the approximate number of colonies which would develop.

The results showed that a concentration of 1 : 100,000 of methylene blue was the most effective, the bacteriophage being completely inactivated after an exposure of four minutes. The process was progressive and commenced from the moment the filtrate was exposed to the light. When the phage was mixed with the bacterial emulsion prior to the irradiation, inactivation was considerably delayed. The nature of this protection, which became progressively greater with the time of contact, was unknown, but it was surmised that it was dependent upon the penetration of the phage into the living cell where, in the absence of molecular oxygen, inactivation could not take place. Killed organisms were incapable of affording this protection. All attempts at reactivating the treated phage by reduction methods were unsuccessful.

In the second paper, these observations were extended to certain ultramicroscopic viruses. Filtrates from Chamberland candles or collodion membranes were mixed with methylene blue and irradiated for varying periods. A table shows that the minimum times for inactivation with a 1 : 100,000 concentration of the dye were as follows :—fowl plague and louping-ill, 5 minutes ; herpes, vaccinia and distemper, 10 minutes ; Borna disease, 20 minutes ; Fujinami tumour, 30 minutes. Foot and mouth disease and ectromelia were more resistant. Virus emulsions in freshly prepared suspensions of living cells from infected animals (as opposed to cells from normal animals or dead cells) were much more resistant to the photodynamic action of the dye.

In vivo experiments with vaccinia and herpes showed that the development of lesions in rabbits could be prevented by the intravenous injection of methylene blue followed by irradiation of the animal, but that treatment had to be instigated within a period varying from 18 to 24 hours after inoculation.—R. E. GLOVER.

VEDDER, A. (1932). Die Hitzeresistenz von getrockneten Bakteriophagen. [**The Heat Resistance of Dried Bacteriophage**].—*Zlb. Bakt. I.* (*Orig.*). **125.** 111-114. [5 refs.]

Bacteriophage filtrates, placed in thin glass bulbs made by blowing out the closed end of test tubes, were dried at room temperature over sulphuric acid or phosphorus pentoxide in a desiccator. Bacteriophage dried in this way was more resistant to heat than when contained in fluids and could even stand heating to 100°C. for ten minutes. This heat resistance can reasonably be explained by the diminished water content of the material subjected to heat. The spores of a strain of *B. megatherium* possessing " gross " lysogenicity heated to this temperature were still able to give rise to typical " wavy " colonies from which bacteriophage could be recovered. The suggestion is that spores are also poor in water content and this fact conceivably would serve to explain the failure to inactivate the phage presumably contained within them.

Arguing along these lines, therefore, the contention of DEN DOOREN DE JONG

[(1931). *Zlb. Bakt. I.* (*Orig.*). **120.** 1.], that his observation brought evidence to support the theory that phage is actually a product of the bacterial cell and not a separate living substance as conceived by D'HERELLE, can no longer be upheld. He suggested that the heating of the spores to 100°C. for five minutes must destroy any phage assumed to be associated with them and that, therefore, any phage which might subsequently be detected in cultures made from the spores must actually be generated *de novo* by the bacillus.—I. A. GALLOWAY.

INVERTEBRATE VECTORS OF DISEASE.

JOBLING, B. (1933). **A Revision of the Structure of the Head, Mouth-Part and Salivary Glands of *Glossina palpalis* Rob.-Desv.**—*Parasitology.* **24.** 449-490. 11 figs., 5 plates. [33 refs.]

Jobling gives a very full and minute description of the anatomy and mechanism of the head, mouth-parts and salivary glands of *Glossina palpalis.* The paper is well illustrated with numerous remarkably good drawings by the author. For details, those interested should consult the original.—J. S. STEWARD.

LEGENDRE, J. (1932). Anthropophilie ou zoophilie chez le moustique commun " Culex pipiens." [**Anthropophilia or Zoophilia in the Common Mosquito *Culex pipiens***].—*Bull. Acad. Méd. Paris.* **107.** 317-320. [2 refs.]

Legendre, in discussing two races of *Culex pipiens* which breed respectively in surface water and " subterranean waters " [water closets], states that the latter race is anthropophilous, whereas in the same district a race of *C. pipiens* breeding in surface water, does not bite man. He hopes that by the introduction of zoophilous races of *Culex* the partial or complete eviction of the anthropophilous race will take place, but if the zoophilous race takes to breeding in water closets he wonders whether the adults, hatching from larvae nourished on human excretal products, will retain their distaste for the blood of man.—J. S. STEWARD.

DISEASES CAUSED BY METAZOAN PARASITES.

MALKANI, P. G. (1932). **Discovery of the Oesophageal Stage Larvae of Hypoderma lineatum, Villiers in Indian Cattle.**—*Ind. Vet. J.* **8.** 178-193. 5 figs. on 1 plate. [42 refs.]

In carrying out *post-mortem* examinations on a large number of hill bulls from the United Provinces the author has found numerous hypoderma larvae in the submucosa of the oesophagus, in the loose connective tissue surrounding the oesophagus, in the connective tissue overlying the rumen and the spleen ; once on the peritoneal surface of the diaphragm and once in the connective tissue overlying the ribs. Examination showed that they belonged to the species *H. lineatum*, this determination being confirmed by PATTON. Attempts at rearing the larvae by subcutaneous engrafting into rabbits and guinea pigs failed.

—E. L. TAYLOR.

I. MACKERRAS, I. M. (1932). **Buffalo Fly Investigations. A Note on the Occurrence of *Hydrotaea australis* Malloch in Northern Australia.**—*J. Sci. & Indust. Res. Australia.* **5.** 253-254. [1 ref.]

II. —. (1932). **The Buffalo Fly Laboratory in North Australia.**—*Ibid.* 256-257. 1 photograph.

I. Mackerras gives a brief description of the muscid fly *Hydrotaea australis* which, in the adult stage, apparently feeds on the sweat and scurf of horses and cattle, and may be mistaken for *Lyperosia*. The larvae live in dung and are predatory on other dipterous larvae and may act in controlling such pests as the stable fly, horn fly and buffalo fly, all of which breed in cattle or buffalo dung. In Northern Australia it occurs throughout the year and it is concluded that it is a useful insect in helping to reduce the numbers of adult *Lyperosia*.

II. A brief description is given of the laboratory used for the buffalo fly investigations in Northern Australia. It measures 30 × 15 feet and was built of ironwood, thatched with grass, and walled with split bamboo. The materials were obtained locally and the total cost was under £50.—J. S. Steward.

Gaschen, H. (1933). Sur la présence de *Xenopsylla brasiliensis* et *Xenopsylla astia* sur les rongeurs domestiques de la région de Dakar. **[The Presence of *Xenopsylla brasiliensis* and *X. astia* on the Domestic Rodents in the Dakar District].**—*Bull. Soc. Path. exot.* **26.** 25-27. [6 refs.]

The writer records the marked predominance of *X. cheopis* on rats in the Dakar district whereas *Synosternus pallidus* is the predominant species in the villages around Tivaouane. Of the fleas taken on rats in Dakar, 64·2 per cent. were *X. cheopis*, 17·5 *Echidnophaga gallinacea*, 12·2 per cent. *X. astia*, 5·5 per cent. *X. brasiliensis*, 0·3 per cent. *S. pallidus* and 0·3 per cent. *Ctenocephalus felis* and *C. canis*.—J. S. Steward.

I. Brug, S. L. (1932). **Chitinisation of Parasites in Mosquitos.**—*Bull. Entomol. Res.* **23.** 229-231. 4 figs. on 1 plate. [11 refs.]

II. Yonge, C. M. (1932). **On the Nature and Permeability of Chitin. I. The Chitin Lining the Foregut of Decapod Crustacea and the Function of the Tegumental Glands.**—*Proc. Roy. Soc. London. Ser. B.* **111.** 298-329. 14 figs., 2 tables. [79 refs.]

I. The writer records the chitinization of an unnamed protozoan parasite seen in sections of a mosquito, *Taeniorhynchus* (*Mansonioides*) *annulatus*, that had been artificially infected with *Microfilaria malayi*. The chitinization of parasites in insects is compared with the calcification of parasites in human pathology.

II. The author shows that the integument of the decapod crustacea consists of two distinct layers, a thin superficial cuticle which is hyaline, and a much thicker underlying chitin, which is lamellated. Details are given of the structure and properties of the chitin, cuticle and the tegumental glands.

Chitin is formed by the chitogenous epithelium, but the substance of the cuticle is elaborated within the tegumental glands and then flows over the surface of the chitin as a thin film which increases in thickness and solidifies, possibly as a result of exposure after ecdysis, when fully formed. The author concludes that the cuticle is probably of fundamental importance in controlling the permeability of the uncalcified integument in decapod and other crustacea, and possibly in all arthropoda.—J. S. Steward.

Hall, M. C. (1932). **The War on Livestock Parasites.**—*Cornell Vet.* **22.** 297-319. 1 chart.

This entertaining article on the control of the parasites of livestock depicts the parasitologists' field of operations as a military campaign. The arthropod and helminth parasites are made to assume the character of the military forces of an enemy country and are divided into 19 " armies " or groups according to their systematic affinities and the points at which they make their attack. The following

16 " weapons " are mentioned as of particular value in control :—manure box, rotation, ploughing under, swine sanitation, snail destruction, fly destruction, grasshopper destruction, cooking of food, meat inspection, modified swine sanitation, mosquito destruction, tick dipping, anthelmintics, feeding of bonemeal, etc., light stocking and bare lot. A chart is given showing how these " weapons " may be used to " cut the enemy lines of communication " and a synoptical key is appended, based on the life history of the parasites and showing briefly the control measures to be adopted.—E. L. TAYLOR.

I. PILLERS, A. W. N. (1932). **Notes on Parasites of Fur Animals and Cage Birds.**—*Vet. J.* **88.** 543-547.

II. SLATTER, E. E., & GRAHAM, R. (1933). **Horse Parasite Control in Illinois.** —*Vet. Bull. U.S. Army.* **27.** 21-28. 2 figs., 1 table.

I. Pillers gives a brief survey of the ecto- and endo-parasites of fur-bearing animals and cage birds, with notes on some of the more important species. There are also short notes on the diagnosis and treatment of the parasitic diseases of the animals mentioned.

II. The writers give an account of the methods adopted in Illinois for the control of bots, ascarids and strongyles of horses. For the control of bots and ascarids carbon disulphide (6 drams per 1,000 lb. body weight) is given in capsules or absorbed on magnesium carbonate. The horses are fasted for 24 to 36 hours before treatment and food and water withheld for five hours after treatment. Numerous dead bots and ascarids were passed after treatment and the majority of the horses treated improved in general condition. In the treatment of strongylidosis, oil of chenopodium was used, followed by carbon tetrachloride in horses that failed to improve after the initial treatment. Photographs taken before and after the treatment of one horse show the improvement that occurred. In addition to medicinal treatment the usual sanitary measures were recommended, namely, the disinfection of barns and yards, the rotation of pastures, the prevention of access of horses to manure heaps and the provision of uncontaminated water supplies. In a footnote it is stated that the average gain in weight of a group of 21 horses treated for a period of six months was 178 lb. per horse, one horse gaining as much as 300 lb.—J. S. STEWARD.

SINGH, S. U., & HICKEY, S. G. M. (1932). **An Investigation into the Control of Fascioliasis in Cattle.**—*Ind. Vet. J.* **9.** 123-128. [4 refs.]

Danistol was found to be more efficacious and much safer for the treatment of fascioliasis in cattle than was carbon tetrachloride. As has been the experience elsewhere, carbon tetrachloride was found to be unsafe, but, on account of its low cost and of the low value of cattle in the district concerned, the use of this drug was found to be the best method for the control of the disease.

Abortion in pregnant cows as a result of the dose was not observed. The findings of other investigators that a second dose is not tolerated so well as the first was confirmed.—E. L. TAYLOR.

SZIDAT, L. (1933). Ueber die Entwicklung und den Infektionsmodus von Tracheophilus sisowi Skrj., eines Luftröhrenschmarotzers der Enten aus der Trematodenfamilie der Zyklozöliden. [**The Development and Mode of Infection of** *Tracheophilus sisowi*, **a Parasite of the Duck's Trachea of the Trematode Family Cyclocoelidae**].—*Tierärztl. Rdsch.* **39.** 95-99. 5 figs. [6 refs.]

The author has succeeded in tracing the life cycle of *T. sisowi* and here gives

a detailed account and description of the various stages. The egg hatches in about 15 minutes in water and gives rise to a miracidium containing a well-developed redia. On finding the suitable host snails, *Planorbis planorbis*, *P. corneus*, *Lynnaea palustris* or *L. ovata*, the redia penetrates and grows, it does not give rise to daughter rediae, but only to cercariae: these encyst in the snail, a circumstance which probably accounts for the cercariae of Cyclocoelidae having previously escaped detection. The cercariae of *T. sisowi* are tailless and possess two suckers. After infection of the final host, the young worms appear in the trachea in six days, but eggs are not produced until the second or third month of parasitic life.

—E. L. TAYLOR.

DATTA, S. C. A. (1932). **The Etiology of Bovine Nasal Granuloma.**—*Ind. J. Vet. Sci. & Anim. Husb.* **2.** 131-140. 12 figs. on 4 plates. [23 refs.]

DATTA, S. C. A. (1932). **The Etiology of Bovine Nasal Granuloma.**—*Ind. Vet. J.* **9.** 111-121. 12 figs. on 3 plates. [23 refs.] [This is a *verbatim* reproduction of the former].

Many opinions have been advanced as to the cause of bovine nasal granuloma, a chronic disease of cattle apparently confined to India. This paper reports the finding in the granulomatous lesions of adult schistosomes and their eggs, resembling *Schistosoma spindalis* Montgomery, though possibly a new species. A detailed study of six clinical cases furnished similar results, and nasal discharges received from other parts of India revealed the presence of schistosome eggs.

—S. H. GAIGER.

JOYEUX, C., & BAER, J. (1932). Recherches sur les cestodes appartenant au genre *Mesocestoides* Vaillant. [**Researches on the Cestodes belonging to the Genus** *Mesocestoides* **Vaillant**].—*Bull. Soc. Path. exot.* **25.** 993-1010. 3 figs. [24 refs.]

The authors found a number of tetracheridia [the larval forms of cestodes belonging to the genus *Mesocestoides*] in the peritoneal cavity of a grass snake, *Elaphe scalaris*, and fed them to a cat; 56 days later the cat was killed and 32 mature worms were recovered, which proved to belong to the species *Mesocestoides ambiguus* Vaillant, 1863.

The intervention of some third host between the cat and the snake is supposed to be a necessary step in the life history and attempts were made to infect *Cyclops* with eggs from the cat. These attempts, however, were unsuccessful. A full account is given of the morphology of the worm and of its diagnosis.

—E. L. TAYLOR.

SOLOMON, S. G. (1932). **On a Collection of Parasitic Worms from East Africa.**—*J. Helminthol.* **10.** 209-230. 20 figs. [31 refs.]

This paper reports on the species of parasitic worms found in three small collections from East Africa. Among those mentioned from cattle are *Fasciola gigantica*, *Cotylophoron cotylophorum*, *Carmyerius exoporus*; from goats and sheep *Stilesia hepatica*, *Ostertagia ostertagi* and *Oesophagostomum columbianum*; from equines *Habronema muscae*, *Anoplocephala magna*, *A. perfoliata* and *Crossocephalus viviparus*; from the dog *Spinocerca sanguinolenta*, and from the fowl *Ascaridia styphlocerca* and *Tetrameres fissispina*. A new species of *Trichuris*, *T. spiricollis*, is also described from the gazelle.—E. L. TAYLOR.

I. GORDON, H. McL. (1932). **Some Helminth Parasites Reported from Australia for the First Time, with a Description of** *Cooperia McMasteri*,

sp. nov., from a Calf.—*Austral. Vet. J.* **8.** 2-12. 6 figs., 1 table. [22 refs.]

II. PURVIS, G. B. (1932). **Cestodes from Domestic Animals in Malaya, with Descriptions of New Species.**—*Vet. Rec.* **12.** 1407-1409. 3 figs., 2 tables.

III. —. (1932). Répertoire des espèces et des genres nouveaux. **[List of New Species and New Genera].**—*Ann. Parasitol.* **10.** 381-384.

I. The occurrence of the following parasites is recorded for the first time in Australia; *Helictometra giardi* (found on numerous occasions, associated with *Moniezia* sp.), *Monodontus trigonocephalus* (only two specimens found), *Ostertagia trifucata*, *Trichostrongylus rugatus*, *T. vitrinus*, *Cooperia oncophora*, *C. punctata* and *Toxascaris leonina*. A new species of *Cooperia* found in a calf is described under the name *Cooperia McMasteri*: the spicules of this species are markedly more slender than those of *C. oncophora* with which it was found.

II. A list is given of 15 species of cestode found in sheep, dog, cat, fowl, duck and dove in Malaya. Two of those found in the fowl appear to be new and are described under the names *Raillietina* (*Paroniella*) *acanthovagina* and *Raillietina* (*Paroniella*) *southwelli*.

III. Only one new species of veterinary interest appears in this list, *Epomidostomum skrjabini* A. M. Petrov, from the gizzard of the domestic goose.

—E. L. TAYLOR.

CAMERON, T. W. M. (1932). **On the Pathogenicity of the Stomach and Lung Worms of the Cat.**—*J. Helminthol.* **10.** 231-234. 8 figs. on 4 plates. [9 refs.]

The eggs of *Aleurostrongylus abstrusus*, laid by the mature worms in the pulmonary artery, pass into the lung and stick in the lumen of the small blood vessels where they lead to thrombus formation and the production of infarcts. If many eggs are produced at one time the involvement of a large amount of lung tissue may speedily lead to the death of the cat. It is usual, however, for the thrombus to become organized quickly and when the eggs are ready to hatch, only traces of the pathological changes remain.

The adults of *Ollunanus tricuspis* burrow into the mucosa of the stomach, but the resulting pathological changes are usually very slight.—E. L. TAYLOR.

SCHWARTZ, B., & PRICE, E. W. (1932). **Infection of Pigs and Other Animals with Kidney Worms, Stephanurus dentatus, following Ingestion of Larvae.**—*J. Amer. Vet. Med. Ass.* **81.** 325-347. [7 refs.]

The authors here give an account of further experiments on the migration of *Stephanurus dentatus*. Having previously shown that, after percutaneous infection (through scarified skin), the larvae of this parasite reach the perirenal fat in 107 to 113 days, passing through the liver and abdominal cavity, the authors have made observations on the development and migration of the worms following infection by the mouth. They are thereby enabled to conclude that the larvae find their way into the blood stream either *via* the mesenteric lymphatic glands and main lymphatic duct, or *via* the portal circulation. Some larvae become side-tracked in the lung and elsewhere, but others reach the liver; of these, some are able to bore their way out and enter the peritoneal cavity and finally make their way through the perirenal fat and walls of the ureters, and a few may eventually reaching the pelvis of the kidney. The shortest time observed for the migration of the worms to the perirenal fat was 137 days.

In guinea pigs the larvae were found in the mesenteric lymph nodes, in the heart blood, spleen, pancreas and elsewhere, but none reached the renal tissue.

A calf was successfully infected as a result of giving larvae by the mouth,

and showed typical lesions in the liver, but no evidence was found of the worms having reached the renal tissues.—E. L. TAYLOR.

STOLL, N. R. (1932). **Note on Re-Infection under " Natural " Conditions with a Gut Nematode of the Rabbit.**—*J. Parasitol.* **19.** 54-60. 1 fig. [3 refs.]

One rabbit, infected with *Trichostrongylus calcaratus*, and six rabbits of the same litter not so infected were allowed to run together in the same small outdoor pen, the course of the infection being followed in each animal by means of egg counts on the faeces.

The extent of the infections produced in the rabbits was found to vary considerably in the different individuals, but only one showed the sudden fall in the egg count similar to that which this author previously demonstrated in infection of lambs with *Haemonchus contortus*. The difference in the infections of the various rabbits can only be explained by individual variations in susceptibility. —E. L. TAYLOR.

SARLES, M. P. (1932). **Development of an Acquired Resistance in Rabbits by Repeated Infection with an Intestinal Nematode,** *Trichostrongylus calcaratus* **Ranson, 1911.**—*J. Parasitol.* **19.** 61-82. 3 tables, 8 graphs. [18 refs.]

Increasing doses of the infective larvae of *Trichostrongylus calcaratus* were given by the mouth and by the skin at weekly intervals to six young rabbits, the resulting infection being followed by egg counts. At first the egg count rose rapidly, but it reached a peak at the 11th to 12th week in those infected by the mouth, and at the 14th to 15th week in those infected by the skin, after which it suddenly fell, and mature worms were observed to be passed in the faeces. The immunity which was thus indicated was found to hold for infection by either the mouth or the skin in both groups of rabbits. In contrast to the sudden loss of infection from rabbits given repeated doses of larvae, the infection produced in a rabbit given a single dose was found to be lost at a constant rate over a period of 49 weeks. It is thought that age resistance played no part in the elimination of these infections.—E. L. TAYLOR.

I. LANE, C. (1932). **Extra-Corporeal Development of Hookworms.**—*Lancet.* **222.** 741-745. 1 table, 2 graphs. [11 refs.]

II. FÜLLEBORN, F. (1932). Ueber die Taxen und das sonstige Verhalten der infektionsfähigen Larven von Strongyloides und Ancylostoma. II. Mitteilung. [**On the Tropism and Other Behaviour of the Infective Larvae of Strongyloides and Ancylostoma. Part II**].—*Zlb. Bakt. I.* (*Orig.*). **126.** 161-180. 12 figs. [12 refs.]

I. Some observations here given from the investigation of 547 hookworm cultures confirm the author's previous findings on the extensive migration of infective larvae from the culture medium. Some means for trapping the escaping larvae should always be provided where it is desirable to ascertain the number of larvae in a culture. In one instance 6,370 larvae were found to have migrated and only 44 could subsequently be extracted from the culture medium. Culture media of three parts soil to one part faeces and a water content varying from 25 per cent. to 50 per cent. showed that within that range the less water there was, the more successful the culture. In the same mixture of soil and faeces with only 9 per cent. of water, i.e. in the state of a coarse powder, 30 per cent. of the eggs were also found to reach the infective stage, showing that development may proceed more successfully than had been supposed in conditions of drought.

II. In 1930 Lane published a paper on the behaviour of hookworm larvae

and came to the conclusion that thigmotaxis explained all the tropisims which Fülleborn and others have described. Fülleborn here discusses the subject further ; he has repeated some of Lane's experiments and some of his own and confirms his previous finding. Photographs are reproduced showing the influence of warmth in attracting the larvae and the action of serum in agglutinating, which he explains by supposing that the serum brings about some change in the sheath of the larvae causing them to adhere together, and that this in some way accounts for their increased activity in its presence.—E. L. TAYLOR.

CRUZ, W. O. (1932). Pathogénie de l'anémie dans l'ankylostomose. Importance prépondérante d'une perturbation dans le métabolisme du fer dans l'organisme. **[The Pathogeny of the Anaemia in Ancylostomiasis. The Outstanding Importance of the Derangement of the Iron Metabolism in the Organism].**—*C. R. Soc. Biol. Paris.* **111.** 483-485.

The author has made a study of the histological changes which take place in the bone marrow of animals affected with anaemia of ancylostomiasis. He mentions a certain case in which 529 worms were expelled as a result of anthelmintic treatment, but the anaemia did not disappear until a course of iron had been administered. Within 21 days of the commencement of this treatment the blood picture returned almost to normal. Cruz considers that a principal cause of the anaemia of ancylostomiasis is an upsetting of the iron metabolism with a resultant check upon the maturation of the erythroblasts.—E. L. TAYLOR.

IMMUNITY.

GORDON, J. (1933). **Some Aspects of the Natural Resistance of the Body to Bacterial Diseases.**—*Brit. Med. J.* Feb. 18th. 263-266. [31 refs.]

After a brief review of the main defences of the body to bacterial diseases in which the author stresses the physical differences and similarities of complement and opsonin, and the functions and physiology of the reticulo-endothelial system, the paper proceeds to a discussion of the nature of complement. It is shown that the action of neutral salts on serum proteins is similar to their dispersive action on gelatin, and the conclusion is drawn that if this similarity is established then the inhibition of complement by neutral salts is due to the dispersion or peptization of the serum by these salts.

In discussing haemolytic and bactericidal complement, reference is made to the four-fold structure of complement, viz. (1) end-piece associated with albumin ; (2) mid-piece associated with serum globulins ; (3) third component, which is removable by yeast and (4) fourth component, which is removable by ammonia, and the conclusion is drawn that, owing to similar behaviour of these substance, in a variety of conditions, it is likely that they possess a similar constitution and are probably identical.

Using organisms of the tribe *Bacterieae* it was demonstrated that absorption of normal serum with emulsions of dead organisms removed the bactericidal power for the least sensitive organisms first, and it is stated that the variations in bactericidal power against different organisms may be attributed to the varying sensitiveness of organisms to non-specific factors in the serum (complement plus a heat-stable factor).

The preparation of leukins from polymorphs by alternate heating and freezing, and treatment with acids, alkalies or normal saline is mentioned, and it is stated that the bactericidal action of this substance is a wide one, and that it is

independent of an immune-body system. α and β lysins are compared and reference is made to a suggestion by PETTERSSON that there are chemical differences between those organisms affected by α lysin (complement system) and β lysin (an " activable " substance) which, unlike immune body, does not attach itself to the bacteria unless the " activating " substance is present at the same time.

Brief reference is made to Fleming's " lysozyme " and it is suggested in conclusion that there are a series of bactericidal powers within the body which require investigation.—EDWARD F. PECK.

MACKIE, T. J., FRASER, A. H. H., FINKELSTEIN, M. H., & ANDERSON, E. J. M. (1932). **The Influence of Nutrition on Susceptibility to a Bacterial Toxin.** —*Brit. J. Exp. Path.* **13.** 328-333. 6 tables, 1 chart. [7 refs.]

[Part of a larger experiment, see this *Bulletin.* **2.** 569].

Four different rations given to separate groups of sheep produced a clear differentiation in growth, in death rate and in general health. Group III (hill pasture, maize, mineral mixture and cod-liver oil) did best ; Groups I and II (hill pasture and maize, and hill pasture, mineral mixture and cod-liver oil respectively) were intermediate, and Group IV (hill pasture only) did worst.

The resistance of the groups to the toxin of the bacillus of lamb dysentery, judged by the cutaneous reaction to 0·5 c.c. of 1 : 1,000 to 1 : 50,000 dilutions of dried toxin, was in the same order. This group variation, which was distinct in May, was no longer marked in late June and absent in the autumn. This change is believed to be related to the nutritive superiority of summer grass.

Averages are given for mortality and fleece weight of the ewes and for birth rate, mortality, birth weight, and weight at weaning of the lambs. The hill pasture was low in lime, phosphorus and chlorine.—A. W. STABLEFORTH.

BORDET, J., & RENAUX, E. (1932). Le rôle de l'alexine dans le renforcement de la virulence microbienne. [**The Rôle of Complement in raising Bacterial Virulence**].—*Ann. Inst. Pasteur.* **49.** 539-544. [3 refs.]

The rough (R) non-virulent variety of *Bact. coli* is very sensitive to the bactericidal influence of guinea pig or rabbit complement, whilst the smooth (S) variety is resistant. Normal serum heated to 56°C. (complement destroyed) does not exhibit any bactericidal power on S or R types. In bouillon containing unheated serum (complement present), S type exhibits a growth after three or four hours' incubation, but R type only begins to show signs of growth after a delay of several hours and, later, when the growth becomes abundant, R is found to have changed to S.

From an active *coli* bacteriophage two lytic agents have been isolated :—(1) a weak phage lysing S but not lysing R and (2) a strong phage lysing both S and R. With the weak agent a few S survive to become R. A bouillon containing complement and weak phage is fatal to both S and R. When sown in such a medium R is destroyed by complement and any S formed is at once destroyed by the phage. When S is sown in this medium the action of phage may give rise to R, but R cannot appear since complement destroys it.

R variety in the presence of complement becomes changed into S and S in the presence of weak phage becomes changed into R in a period of less than 24 hours. This is a remarkable circumstance since the R and S types are so clearly defined and distinguishable. S colonies, no matter how long maintained as S, never lose the power to become R, though it can be shown by experiment that not many of the individuals are invested with this faculty.—S. H. GAIGER.

ZINSSER, H., & CASTANEDA, M. R. (1933). **Studies on Typhus Fever. X. Further Experiments on Active Immunization against Typhus Fever with Killed Rickettsia. XI. A Report on the Properties of the Serum of a Horse Immunized with Killed Formalinized Rickettsia.**—*J. Exp. Med.* **57.** 381-390 and 391-398. 1 table, 4 charts. [8 refs.]

Formolized vaccines afford a definite protection to guinea pigs against subsequent infection with Mexican typhus, provided that such vaccines contain a sufficient number of rickettsia. Such vaccines can be produced by the inoculation of rats whose resistance has been lowered by X-ray treatment. The immunity persists for at least 107 days and the subcutaneous route of inoculation was as successful as the intraperitoneal route. Only very feeble protection against European virus was obtained.

By repeatedly inoculating a horse with formolized rickettsia, the Weil-Felix reaction of the serum was raised from 1 : 40 to 1 : 160 and over. The serum afforded some protection to guinea pigs whether given before, simultaneously with, or after the injection of test virus. No protection was obtained against European virus, but the therapeutic value of such sera in human disease is worthy of consideration.—NORMAN HOLE.

I. GWATKIN, R. (1932). **Fatal Results in Guinea Pigs following Intra-Abdominal Injection of Fresh Cow Serum.**—*J. Amer. Vet. Med. Ass.* **81.** 250-251. [1 ref.]

II. REICHLE, H. S., & GOLDBLATT, H. (1933). **The Sensitization of Guinea Pigs and the Production of Allergy and Anaphylaxis to Tuberculoprotein.**—*Amer. Rev. Tuberc.* **27.** 291-307. 5 figs., 4 tables, 1 chart. [21 refs.]

I. Gwatkin observed that cow serum in doses greater than 1 c.c. was fatal for guinea pigs when injected intraperitoneally. When given in 5 c.c. doses, symptoms appeared in one to two minutes, the hind quarters became paralysed in about 20 minutes and death occurred in one to two hours. Subcutaneous injection of serum gave rise to slight or no nervous symptoms and was followed by sloughing of the skin.

On autopsy there was severe congestion of the abdominal organs and peritoneum and haemorrhages in the liver and spleen.

Fresh cow serum added to a suspension of guinea pig red cells in 0·85 per cent. saline in doses of 0·01, 0·1 and 1 c.c. and incubated at 37°C. caused haemolysis of the red cells in ten minutes in the 1 c.c. tube ; 0·01 c.c. of serum did not cause haemolysis. Serum heated to 56°C. for 30 minutes did not produce haemolysis and was harmless for guinea pigs. Serum held for about nine days lost its haemolytic activity and was innocuous for guinea pigs.

II. Reichle and Goldblatt carried out an investigation of the mechanism of the tuberculin reaction. Normal guinea pigs were injected intracutaneously with 0·1 to 0·2 c.c. of 1 : 10 tuberculin (O.T.) and various adjuvant substances such as eye fluid of normal guinea pigs and horse serum.

On retesting these animals with O.T. 72 to 96 hours after the first injections, 55 out of 102 animals used exhibited allergic reactions.

Vesiculation and ulceration were absent and the reactions usually reached their highest point of development about the 24th hour. Similar reactions were obtained with Seibert's " tuberculo-protein."

In the early stages of experiments the guinea pigs were not sensitive to glycerine-broth, but after repeated injections with O.T. they developed sensitivity to the glycerine-broth.

Details of results obtained with the Long testicular test for allergy and the Dale test for anaphylaxis are given.—T. M. Doyle.

Christenson, I. (1932). Om provokationsprovet som hjälpmedel vid diagnos av rots och tuberkulos samt om tuberkelbacillens cyklogeni. [**The Provocation Test as an Aid to the Diagnosis of Glanders and Tuberculosis; also the Life Cycle of** *Mycobacterium tuberculosis*].—*Svensk Vet.-tidskr.* **37.** 301-317. 3 figs. [12 refs.]

The writer gives an account of the work of Prof. K. Panek with whom he has studied at Bromberg, in Poland.

Panek has prepared a substance he calls " tensin " which will provoke or reactivate latent tuberculosis or glanders in animals causing the infections to develop into the acute forms. " Tensin " is prepared chemically from the bodies of bacteria and occurs as water-soluble crystals; its chemical formula is not yet worked out, but it is believed to be an amino-acid complex. " Tensin " is specific for the bacteria from which it is obtained and experiments have been done chiefly with " tuberculotensin " and " morvotensin " obtained from *M. tuberculosis* and *Pfeifferella mallei* respectively. By the injection of the specific " tensin," a positive diagnosis may be made in cured and latent cases of tuberculosis and glanders which are negative to ordinary serological tests. Similar technique is used in this provocation test for both glanders and tuberculosis.

The " tensin " is injected subcutaneously behind the shoulder and in healthy animals causes no reaction. In affected animals the temperature begins to rise in four to six hours. In acute cases it may remain high until death takes place from generalization, while in cured cases it falls to normal in 24 hours.

In glandered horses, a local swelling and oedema, analagous to the local reaction to mallein, develops at the site of injection after 24 hours. The surrounding skin, lymphatic vessels and glands show changes which, in appearance, are very like those of cutaneous glanders. In cured cases the swelling is much less and there are no changes in the lymphatic system.

" Tuberculotensin " unlike " morvotensin " causes no characteristic cutaneous reaction. When injected into guinea pigs which have been inoculated several weeks previously with BCG vaccine it will reactivate the attenuated bacilli and cause death in a very short time from generalized tuberculosis.

Panek has succeeded in cultivating the granular and coccal forms of *M. tuberculosis* from filtrates of cultures through Chamberland and Berkefeld filters. From this filtrable virus he has infected healthy animals with the disease and by further cultivation and passage has been able to change the granular forms into the bacillary form. The virulence of both avirulent *M. tuberculosis* and *Pf. mallei* can be restored both *in vivo* and *in vitro* by the use of the specific " tensin."

An immune serum prepared from horses hyperimmunized with the granular and filtrable forms of *M. tuberculosis* has given good results in the treatment of local lesions in both man and animals. Serum given simultaneously with a vaccine made from the filtrable virus has conferred a very high immunity on laboratory animals against all types of *M. tuberculosis*.

Panek thinks that many of the so-called filtrable viruses, such as those of rabies and foot and mouth disease, are but a stage in the life cycle of visible bacteria, which only become pathogenic during one or other of their stages.

—A. A. Forsyth.

I. Shwartzman, G. (1932). **Further Studies on the Nature of the Phenomenon of Local Skin Reactivity to Bacterial Filtrates. Toxic Factors**

derived from the Blood Serum.—*J. Exp. Med.* **56.** 291-305. 6 tables. [12 refs.]

II. SHWARTZMAN, G. (1932). **Phenomenon of Local Skin Reactivity to Bacterial Filtrates : Reactivating Effect of Blood Sera upon completely Neutralized Toxic Filtrates.**—*Ibid.* 677-686. 5 tables. [3 refs.]

III. SHWARTZMAN, G. (1932). Une nouvelle propriété du sérum sanguin empêchant la neutralisation des substances toxiques bactériennes. [**A New Property of Blood Serum preventing the Neutralization of Toxic Bacterial Substances**].—*C. R. Soc. Biol. Paris.* **111.** 268-269. [7 refs.]

IV. SHWARTZMAN, G. (1932). **Phenomenon of Local Skin Reactivity to Bacterial Filtrates : Formation of Reacting Factors** *in vivo*.—*J. Exp. Med.* **56.** 687-703. 4 tables. [16 refs.]

I. The author has previously pointed out that the *sine qua non* of the phenomenon of local skin reactivity to bacterial filtrates is that the second injection be given *via* the blood stream. This observation suggested to him that some interaction between the toxic substances injected and the blood may occur prior to the elicitation of the reaction. The studies described in this paper were made to determine whether a disturbance in the colloidal state of the blood would bring about the formation of reacting factors. It was found that precipitates derived from mixtures of serum precipitinogen with precipitating antiserum were able to elicit severe injury in skin sites prepared with bacterial filtrates. Clear supernatant fluids obtained by centrifugation of partially precipitated sera also elicited severe reactions. From this evidence and that obtained from other experiments it was deduced that the reacting potency of such serum precipitates is not due to the mechanical effect of colloidal particles in the blood stream, but to some toxic factors liberated or formed in the serum through the colloidal disturbance induced by the process of antigen-antibody interaction. It is suggested that, in the same way bacterial filtrates, when inoculated intravenously, have no direct reacting potency, but also induce a colloidal disturbance in the blood, which brings about liberation or formation of reacting toxic factors which are able to elicit severe injury in tissues made vulnerable by a bacterial filtrate. Agar, the only inert colloidal suspension of a group tested by SICKLES [(1931). *J. Immunol.* **20.** 169.] and the author, found to possess reacting potency, may possibly produce its effect by a similar mechanism.

II. & III. These two papers deal with the same observations, the second being a short résumé in French of the subject matter contained in the first. In previous communications the author reported that the reacting factors of the phenomenon of local skin reactivity can be neutralized specifically by immune sera in multiple proportions. He here reports observations on a property of normal and immune blood sera of various animal species which consists of the reactivation or restoration of toxicity of completely neutralized bacterial filtrates. The property possessed by these sera has no apparent relationship to the complement content. It is heat labile and deteriorates on storage. It is apparently not specific since the same sera were found to be effective against the neutralized reacting factors of the meningococcus and the neutralized reacting factors of *Bact. coli*. The property is possessed by normal human serum [53 per cent. of those tested], horse and guinea pig serum and rabbit serum [72 per cent.] and certain immune horse sera. The property of the immune sera can be destroyed by a temperature of 37°C. for four hours, which has no destructive effect upon the neutralizing antibodies. The possible immunological significance of the reactivating property is discussed.

IV. From the results of experiments [recorded in I] the author concluded

that the reacting potency of mixtures or serum precipitinogens with precipitating antisera was due to some toxic factors liberated or formed in the sera through the colloidal disturbance induced by the antigen-antibody interaction. The purpose of the work embodied in the present paper was to determine whether the reaction between the antigen and antibody *in vivo* would bring about formation of reacting factors in the blood stream. Rabbits " sensitized," one week previously, to some animal protein (e.g. blood serum or egg white) received an intradermal injection of 0·25 c.c. of undiluted bacterial filtrate of known skin-preparatory potency. Twenty-four hours after the skin preparation the rabbits received an intravenous injection of the same animal protein. From four to five hours later there appeared severe haemorrhagic necrosis at the prepared skin site. A single " sensitizing " injection and an interval of one week before the test dose appeared to be sufficient. The necessary " sensitization " could be effected with minute quantities of animal protein. The incidence of positive results was high and is said to be highly specific unless repeated sensitizing injections of large doses of antigen are made. It was also found possible to elicit severe reactions in the prepared skin sites of " non-sensitized " rabbits upon separate intravenous injection of non-bacterial and bacterial antigens and homologous antibodies (i.e. passive transfer). The author wishes it to be clear that the rabbits were not sensitized in the true sense of the term (for this reason the abstractor has used inverted commas) and therefore the test injection of the protein had no "shock" effect. Hence the test described is clearly differentiated from the Arthus phenomenon. The evidence produced therefore strongly suggests that antigen-antibody interaction *in vivo* leads to the formation of toxic factors which are capable of inducing severe injury in tissues prepared by potent bacterial filtrates.

The relation between the phenomenon of local skin reactivity to bacterial filtrates and various fields of immunology is also discussed in the light of the observations recorded.

The author's suggestion, with regard to the necessity of investigating the reacting factors under discussion, in relation to the toxic principles associated with the antigen-antibody union in anaphylactic shock and the Arthus phenomenon (or so-called " local anaphylaxis ") is not without its significance.

—I. A. Galloway.

Besredka, A. (1932). **Are Antiviruses Specific?**—*J. Immunol.* **23.** 349-360. [50 refs.]

In this review, Besredka attempts to answer the criticism that the antiviruses are not specific. The problem resolves itself into a question as to whether they act, as does ordinary broth, by increasing the resistance of the body cells, or whether they confer a true local immunity which is specific. The author maintains that the work of numerous investigators on the staphylococcus clearly shows that, *in vitro*, the antivirus prevents the development of the corresponding bacterium, acts in a selective manner on leucocytes and gives a specific fixation reaction ; while *in vivo*, the application of antivirus to the skin or eye, or injected intraspinally, induces a specific neutralization.

The application of antivirus therapy to other organisms is then reviewed, from which the conclusion is drawn that the antiviruses are endowed with a specificity as strict as that of the bacteria from which they come.—R. E. Glover.

DISEASES, GENERAL.

KÜST. (1933). Die Behandlung der erkrankten Gebärmutter des Rindes. [**The Treatment of the Diseased Uterus of Cattle**].—*Tierärztl. Rdsch.* **39.** 17-21 and 36-38. 5 figs. [Lecture delivered at 92nd Meeting of the Association of German Biologists and Doctors, Wiesbaden, September, 1932].

This article deals in detail with the diagnostic and therapeutic aspects of metritis, pyometra, etc., in the heifer and cow.

Apart from manual vaginal and rectal examinations, a number of special instruments are of great value : the author uses a set of six plain metal plated tube specula of graded sizes for inspecting the vagina and cervix of the uterus and a valuable adjunct to these is a dry battery-operated illuminator carrying the bulb at the end of a long rod, which is inserted in the speculum. These instruments are illustrated, as also is GÖTZE's uterine catheter for obtaining sterile samples of uterine secretion.

With regard to treatment, the Albrechtsen method is first described, and the correct method of irrigating the uterus is discussed. The author uses exclusively warm normal saline solution for this purpose and assists the outflow by uterine massage *per rectum*. As the author considers that all the common uterine infections are amenable to chemotherapy, it is not of practical importance to find out the bacterial species involved. After irrigation, therefore, the author inserts a few entozon bars and sometimes, in appropriate cases, employs non-specific stimulation therapy as well. It is also often advisable to procure the beginning of a new ovarian cycle by the enucleation of any persisting corpus luteum.

The results of these methods in the treatment of 55 cases sent to the veterinary obstetrical clinic at Giessen University are described.

In conclusion the author emphasizes the importance of a thorough examination of the whole animal before beginning to apply local treatment. Treated animals should not be bred for over six weeks after release.—J. E.

ELZÉN, S. (1932). Perniciös myosit och korsförlaming hos häst. [**Pernicious Myositis and Azoturia in the Horse**].—*Svensk Vet.-tidskr.* **37.** 197-206.

ELZÉN, S. (1932). Ytterligare något om myosit hos häst. [**Further Notes on Myositis in the Horse**].—*Ibid.* 369-378.

Methylene blue, when administered in the early stages, has given excellent results in the treatment of pernicious myositis and azoturia in horses. The average dose is 1 g. of methylene blue dissolved in 200 g. of boiled water, injected intravenously, and 1 g. given in drinking water three times daily for three days. Food is withheld for 24 hours. Absolute quiet is essential and narcosis may be necessary to ensure this. Warm wet bandages and compresses are applied to the affected parts wherever possible.—A. A. FORSYTH.

HARVEY, F. T. (1932). **Contagious Irido-Cyclitis in Sheep.**—*Vet. Rec.* **12.** 1413.

The author described a contagious disease of sheep in Cornwall taking the form of an irido-cyclitis with a milky condition of the aqueous humour ; the cornea remains normal. The condition is always bilateral and causes blindness, but recovery is usually complete in one week.

MAYALL, in correspondence in the *Veterinary Record*, drew attention to reports on the same or similar disease on the continent. HEATLEY also wrote of an outbreak of contagious opthalmia with corneal opacity in a flock of Suffolk

sheep in 1920. GRAY drew attention to numerous reports of the disease in the English veterinary press of the last century.—J. E.

PORTER, D. A., & ACKERT, J. E. (1933). **The Effect of Blood Loss upon the Resistance of Chickens to Variable Degrees of Parasitism.**—*Amer. J. Hyg.* **17.** 252-261. 1 table, 1 chart. [9 refs.]

In the experiments described a total of 300 chicks were used, which were separated into equal lots according to weight. One lot was bled weekly (15·5 c.c. blood being removed in all from each bird during a period of five weeks); the other lot acted as a control and was not bled. The criteria for determining whether the resistance of the chickens to the parasite was affected were the numbers of nematodes (degree of infestation) and the lengths of the worms (rate of growth).

The results of the experiment indicate that repeated loss of blood may lower the resistance of chickens to the intestinal nematode *Ascarida lineata*. When large numbers (300 or 500) of eggs were fed, three of the four lots bled showed significantly longer worms than the unbled controls. While several comparisons did not result in significant differences (due to variability), the worms from the bled lots of chickens were longer than those from the controls in nine of the ten groups in which comparisons were made. The lowered resistance is thought to have been due to a physiological reaction in which the growth inhibiting mechanism was affected.—J. S. STEWARD.

CATCHPOLE, A. M. (1932). **Outline of a Few Diseases which occur in Silver Foxes bred in the British Isles.**—*Vet. J.* **88.** 547-549. 3 figs. on 1 plate.

Comparatively little disease has occurred among adult silver foxes bred in this country, but the mortality among cubs is enormous. Round worm infestation is the commonest trouble, but owners who can succeed in the very difficult task of eradicating worms from the foxes and eggs from the pens find that dosing of the cubs, always very risky, is unnecessary. Raw rabbit meat is the usual diet and this may account for some of the tape worm infestation. Rickets is occasionally seen, but skin diseases are uncommon, though ear-mange (called " ear-mite " by fox farmers) occurs, and a peculiar irritation of the tail leading the fox to bite off the tip. One outbreak of distemper has occurred and farmers are now inoculating against the disease, canine serum being used. Malignant jaundice is occasionally contracted from rats, but usually responds to serum treatment. A rapidly fatal disease, characterized by a species of epilepsy, attacks cubs and may be what is known in Canada as contagious infectious meningitis. A considerable field awaits investigation among these animals, whose numbers are steadily increasing.

—F. BULLOCK.

SEEKLES, L., & SJOLLEMA, B. (1932). Untersuchungen über die Aetiologie der Grastetanie. I. Mitteilung. Die Aufnahme, Umsetzungen und Ausscheidung von in Lösung zugeführtem Kaliumnitrat beim Rinde. Die Zusammensetzung des Blutes bei der Nitratvergiftung. [**Aetiology of Grass Tetany. I. Absorption, Metabolism and Excretion of Potassium Nitrate given in Solution to Cattle. Composition of the Blood in Nitrate Poisoning**]. —*Arch. wiss. prakt. Tierhlk.* **65.** 331-343. 9 tables. [12 refs.]

SEEKLES, L., & SJOLLEMA, B. (1932). Das Blutbild in der Kaliumnitratvergiftung. Ein Beitrag zur Kenntnis der Methämoglobinbildung im Tierkörper. [**The Blood Picture in Potassium Nitrate Poisoning. A Contribution to our Knowledge of the Formation of Methaemoglobin in the Animal Body**]. —*Acta Brevia Neerlandica.* **2.** 226-227.

These two papers overlap considerably and may therefore be abstracted together.

The authors refer to the high nitrate content of the young grass of improved pastures (up to 2 per cent. expressed as potassium nitrate) and calculate that a cow in full lactation might ingest 300 g. potassium nitrate per day. They consider this fact in relation to lactation tetany [grass tetany, see SEEKLES, & SJOLLEMA, this *Bulletin*. **2.** 91.] and conduct experiments on the lines indicated by the titles. Their results may be summarized as follows :—

(1) Feeding a year-old ox on about 62 g. potassium nitrate per day for 116 days produced no adverse effects.

(2) Quantities of 100 to 200 g. when introduced suddenly into the rumen (by fistula) caused symptoms of poisoning—increased heart frequency, stertorous breathing, followed by diarrhoea, reduced appetite and loss of weight.

(3) About one-tenth of the nitrate was reduced to nitrite in the rumen and the absorption of this, which caused conversion of about one-fifth of the blood haemoglobin into methaemoglobin, accounted for the symptoms observed.

(4) The greater part of the nitrate disappeared from the rumen in about three hours ; excretion in the urine commenced at once but continued for 12 hours, thus indicating temporary storage in the tissues.

(5) The concentrations of nitrite in blood and urine were similar, but for nitrate the urinary value could rise to 50 times the blood figure, indicating a specific concentrating power of the kidney for nitrate but not for nitrite.

(6) The behaviour of blood minerals was irregular but in general the calcium, magnesium and inorganic phosphorus were reduced by about a fifth during the six hours following administration (height of the nitrite effect) but quickly returned to normal—or even above normal in the case of magnesium.

(7) The symptoms in no way resembled grass tetany, and cows which had previously suffered from this disease were not more susceptible to nitrate poisoning than other cows.—H. H. GREEN.

I. SJOLLEMA, B., & SEEKLES, L. (1933). Untersuchungen über die Aetiologie der Grastetanie. II. Mitteilung. Der Einfluss einer Aufnahme von grösseren Mengen Eiweisskörper. [**Aetiology of Grass Tetany. II. Effect of High Protein Intake**].—*Arch. wiss. prakt. Tierhlk.* **66.** 60-69. 8 tables. [5 refs.]

II. SEEKLES, L., & SJOLLEMA, B. (1933). Untersuchungen über die Aetiologie der Grastetanie. III. Mitteilung. Die Fütterung von Rindern mit nitrathaltigem Gras. Die kombinierte Wirkung von Nitrat und Graseiweiss auf den Mineralbestand des Blutserums. [**Aetiology of Grass Tetany. III. Feeding Cattle with Grass containing Nitrate. Combined Effect of Nitrate and Grass Protein on Minerals of Blood Serum**].—*Ibid.* 117-123. 4 tables. [3 refs.]

I. Authors suggest that the very high protein content of young manured pastures may be concerned in the aetiology of lactation tetany [grass tetany, see SJOLLEMA, this *Bulletin*. **3.** 90.], pointing out that a dairy cow on April or May grass may ingest from 4 to 5 kg. protein per day—two to three times the normal amount.

They record experiments on high protein intake using soya meal (39 per cent. protein), earthnut meal (49 per cent. protein) and wheat gluten (71 per cent. protein), gradually increasing the quantities until maximum pasture levels were reached (maximum 4·26 kg. gluten protein). One of the experiments was carried out on a five-year-old cow that had suffered from grass tetany the year

before. The remaining five were carried out on a year-old ox with a stoppered ruminal fistula through which the protein concentrates, emulsified with water, were passed. This procedure was rendered necessary by the fact that animals, however hungry, refused to repeat consumption of excessive protein after a trial meal.

In the final experiment the ox became ill three hours after the last administration of wheat gluten (total consumption of 17 kg. gluten protein in three days) and died several hours later. Symptoms were colic, accelerated pulse and respiration, muscular tremors and final dyspnoea, but autopsy failed to throw further light on the cause of death.

The general conclusions may be summarized as follows :—

(1) Large quantities of earthnut meal, soya or wheat gluten led to increased respiration and cardiac frequency ; this was probably related to the well-known " specific dynamic effect " of proteins.

(2) Earthnut meal in large amount caused a decrease in serum calcium (maximum fall 47 per cent.), a definite fall in serum magnesium (maximum 35 per cent.) and a variable small change in inorganic phosphorus.

(3) Soya meal and wheat gluten had no such specific effect and the fact that peptone, and protein-free extracts of grass and of oats, were found (data to be published later) to exercise similar effects suggested that the influence on the level of blood minerals was due either to protein aporrhegmas or to some special constituent of earthnut meal.

(4) Blood proteins, urea and amino-acids were little affected but " rest nitrogen " [i.e. nitrogenous constituents unaccounted for] was high, thus suggesting a flushing with uninvestigated protein hydrolytic products.

(5) In the case of the soya bean feeding there was considerably increased urinary excretion of calcium, magnesium, nitrogen and inorganic phosphorus for many days after cessation of protein administration, with albuminuria at the height of phosphorus elimination.

(6) In the case of the ox that died after excessive administration of wheat gluten there was hyperglycaemia (383 mg. per cent. glucose) and glycosuria ten hours before death. Although the clinical symptoms were reminiscent of grass tetany the blood picture did not correspond.

II. The authors refer to the first communication of the same series [see this *Bulletin*. **3.** 90 and 201.] and record experiments on the administration of three samples of pasture rich in protein and high in nitrate (from 1·76 to 2·3 per cent. of potassium nitrate expressed on the dry matter of the grass). A five-year-old cow consumed 27 kg. of fresh grass in 8 hours, 27 kg. in the next 19 hours, and then refused further offers. At a later date it consumed 50 kg. of another nitrate-rich fresh grass in the first 17 hours ; a further 20 kg. during the ensuing 17 hours, and then refused to touch it again—even while bellowing with hunger and ravenously devouring any normal grass or hay when offered. Although the nitrate in the grass consumed was insufficient to produce appreciable methaemoglobinaemia the serum calcium fell from 11 mg. per cent. to 7·7 mg. per cent. in 72 hours, and the serum magnesium from 2 mg. to 1·2 mg. in 48 hours (rising to 2·6 mg. in the ensuing 24 hours). The variations in inorganic phosphorus were small and irregular.

A year-old ox was forcibly fed with grass emulsions through a ruminal fistula but the quantities so introduced were not so high as a normal grazing intake would have been. It showed a small fall in serum calcium but no change in serum magnesium.—H. H. Green.

I. GOFFINET, L. (1932). Sur les applications thérapeutiques des sels de calcium. [**Calcium Therapy**].—*Ann. Méd. vét.* **77.** 260-267 and 349-372. [60 refs.]

II. ROSSIGNOL, E. (1932). Formes atypiques du syndrome vitulaire. [**Atypical Milk Fever**].—*Rec. Méd. vét.* **108.** 672-674.

III. VLADESCO, R. (1932). Carence minérale chez les vaches laitières. [**Mineral Deficiency in Lactating Cows**].—*Le Lait.* **12.** 775-778. 1 table.

I. A review article on the therapeutic use of calcium salts appearing in two portions.

The first portion is general and deals with the need for calcium in the animal economy; quantities of calcium present in certain food-stuffs, tissues, body fluids and secretions; absorption, fixation, secretion and excretion of calcium; therapeutic use of calcium salts and the advantages of the gluconate over the chloride.

The second portion deals more particularly with milk fever, discussing normal calcaemia, hypocalcaemia and associated disturbances, physiological mechanisms involved in milk fever, experimental hypoglycaemia induced by insulin and experimental hypocalcaemia produced by injection of sodium citrate; various methods of treating milk fever and possible preventive measures. The author considers that, with further improvements in technique, calcium therapy will replace insufflation.

II. Describes six cases of atypical milk fever cured by the usual insufflation procedure—two occurring during pregnancy, two after calving but with paraplegia, and two showing eclampsia.

III. The author observes high elimination of phosphorus in the urine of stalled cows, finds that the ration contains 57 g. calcium oxide and 51 g. phosphoric acid, empirically assumes that requirements were 100 g. and 75 g. respectively, and attributes the presence of urinary phosphate to withdrawal of calcium from the skeleton for milk production, with consequent elimination of surplus phosphorus [theoretical—contrast the experimental observations of FITCH, BOYD, ECKLES, GULLICKSON, PALMER and KENNEDY, this *Bulletin.* **2.** 613].—H. H. GREEN.

PUBLIC HEALTH.

TORRANCE, H. L. (1932). **The Detection of the Source of Infection in Tuberculous Milk.**—*Vet. Rec.* **12.** 865-874. [Paper presented to the Lancashire Division of the National Veterinary Medical Association of Gt. Britain and Ireland, May 25th].

The author adopted the following procedure:—Mixed milk samples were taken from the farms and submitted to biological examination. Immediately a positive sample was found a visit was made to the farm concerned and, after obtaining a history of all the cows in the herd, they were all clinically examined. Individual samples were taken from cows suspected of being affected with tuberculous mastitis and a group sample taken from the remainder. Individual samples were examined microscropically and, if the result was positive, the cow was dealt with under the Tuberculosis Order. Samples negative to microscopic examination were submitted to further biological examination. The group sample was also examined biologically.

Out of 1,288 mixed samples taken during 1931, 108 were positive to guinea pig inoculation. Of these, 84 were definitely traced while 24 were not. Thirteen of the untraced cases had been sent to knackers' yards or otherwise removed.

The possibility of the milk becoming infected through the milker or from

contamination by infected excreta or the possibility of the bacillus being excreted intermittently in the milk might account for the remaining 11 untraced cases.

The types of cases which in their early stage presented the greatest difficulty to the author in diagnosis were :—(1) tuberculosis of the fore quarter ; (2) mixed infection of a quarter ; (3) non-tuberculous mastitis of one quarter and tuberculosis of one quarter in the same udder ; (4) rare cases where infection gained entrance by the supramammary lymph gland and (5) tuberculosis in the udder of a dry pregnant cow.—H. G. LAMONT.

I. McKay, A. L., Currey, D. V., McNabb, A. L., & Berry, A. E. (1932). **An Epidemic of Milk-Borne Paratyphoid Fever, St. Catherines, Ontario, 1931. I. Epidemiological Features. II. Clinical Aspects. III. Bacteriological Studies. IV. Milk Pasteurizing Equipment.**—*Canad. Publ. Health J.* **23.** 303-313. 1 fig., 2 tables.

II. Seiler, H. E. (1932). **Outbreak of Scarlet Fever associated with Inefficient Pasteurisation.**—*Med. Officer.* **48.** 45-46. 3 tables.

I. An explosive outbreak of paratyphoid fever affecting 457 human beings was traced to a contaminated milk supply. It was assumed that the milk of one or more farms became infected during a severe thunderstorm, as it was the custom to cool the milk by partial immersion of cans of milk in an adjacent creek. The creek had risen during the storm and creek water, which showed evidence of sewage contamination, probably gained entrance to the cans of milk. The raw milk was delivered to the dairy for pasteurization and a survey of the plant indicated defects in the system. Two pasteurizing tanks were built side by side, and whilst one tank of pasteurized milk was being pumped to the cooler the other was being filled and pasteurized. Both tanks had valves projecting through the wall to another room and these valves were connected to a common outlet. Owing to an error, one of the operators opened the wrong outlet valve and permitted raw unpasteurized milk to reach the cooler. No attempt to repasteurize the milk was made. Criticism is made of the layout of the plant, especially of the division into two rooms, the use of a common outlet for two tanks, and the use of a milk cooler which was uncovered. The most important lesson to be learnt is that pasteurizing equipment needs supervision and that no equipment should be installed which will permit mistakes to be made so easily by an operator.

The causal organism was *Bact. paratyphosum* B which was isolated from 25 of 80 samples of faeces and 38 of 115 samples of blood. Attention is drawn to the isolation of the causal organism from 16 samples of blood, the sera of which failed to show agglutinins for the bacterium concerned. These were from early cases before agglutinins had developed and show the desirability of submitting whole blood rather than serum for investigation.

II. This is an account of a milk-borne epidemic of scarlet fever, associated with the temporary breakdown of a pasteurizing plant. A broken valve interfered with the steam supply to the jacket of the milk containers. At the time of inspection the milk was not being held and the temperature to which it was being raised was only a little over 120°F. As a temporary measure the " flash " system was instituted and appeared to be successful. The source of the epidemic was assumed to be a farm where there had occurred cases of scarlet fever and sore throat among the employees. Owing to the same daily procedure of the arrival, pasteurizing and delivery of the milk, the epidemic was restricted for some time to the supply of one branch shop which presumably was receiving the bulk of the milk from the suspected farm. Later in the epidemic the supply of other branches became involved.—R. LOVELL.

I. —. (1933). **Report of the Reorganisation Commission for Milk. Ministry of Agriculture & Fisheries.** *Econ. Ser.* No. 38. pp. 228. 29 tables. [33 refs.] London: H.M. Stat. Office. [6d.]

II. —. (1933). **The Marketing of Milk.**—*Lancet.* **224.** 312-314.

III. —. (1933). **Milk Reorganisation Commission.**—*Vet. Rec.* **13.** 128-134. 1 table. [2 refs.]

IV. —. (1933). **The Milk Commission's Report from the Farmers' Standpoint.** —*Vet. J.* **89.** 140-141. [1 ref.]

I. This is a report of the Commission appointed by the late Minister of Agriculture to prepare a scheme or schemes for regulating the marketing of milk in England and Wales. It reviews the present position and makes important recommendations. The daily *per capita* consumption of milk in England and Wales is estimated at between one-third and two-fifths of a pint, the total requirements being between 607 and 730 million gallons of liquid milk annually. Consumption tends, however, to diminish, a state of affairs due to some extent to publication of the fact that raw milk may contain living tubercle bacilli. The control of milk production—including inspection—lacks uniformity, the provisions of the Milk and Dairies Order being interpreted in a widely different manner by different local authorities. Six counties and 25 boroughs employ whole-time veterinary officers to carry out routine inspections of cattle; eight counties and 85 boroughs employ part-time veterinary officers for this purpose, but in 45 counties and 84 boroughs there is no routine inspection. The Milk and Dairies Order and the Tuberculosis Order, which are complementary, cannot be worked effectively without an adequate staff of veterinary inspectors available for the administration of both. The defects of the Milk (Special Designations) Order are laid bare and the view is expressed that the most serious hindrance to the securing of an increased consumption of milk is the lack of any guarantee that ordinary ungraded milk is of recognized hygienic quality.

The Commission, while confessing their incompetency to judge the merits of pasteurization, declare that pasteurization can never be a substitute for clean milk production and that compulsory pasteurization would in this respect be a retrograde step.

The recommendations of the Commission cover the whole ground of the production and distribution of milk, including those of veterinary interest relating to the compulsory routine inspection of dairy cattle. It is declared that the most effective measure for tackling the serious problem of tuberculosis infection of the milk supply is the routine clinical examination of all dairy cows by whole-time veterinary officers, a reform which should be introduced with the least possible delay. Until adequate veterinary services are provided by local authorities the certificate of an approved private veterinary practitioner might be accepted as an alternative to the certificate of the veterinary officer, but the appointment of a whole-time chief veterinary inspector by the Council of each county and county borough is urged as the irreducible minimum and as the first step in the setting up of an adequate veterinary service. Such a service would be of great value not only to producers and distributors, but to consumers, who would be assured of an increasing supply of reasonably safe raw milk. Even a single chief veterinary officer, giving the whole of his time, could do much to organize the service, to co-ordinate the work of part-time officers and gradually bring about uniformity in the interpretation of the various orders and consistency in administration. The Ministry of Health would be able, once such officers were in being, to introduce a reasonable measure of uniformity and consistency as between different areas. A whole-time veterinary service would, however, prove considerably cheaper than the present system. On the assumption that one officer could examine

10,000 cows three times in twelve months, it is estimated that the examination of the whole of the dairy herds in England and Wales would involve the employment of 300 whole-time inspectors at a cost for salaries, travelling and administration expenses of about £300,000. Allowing for the expenditure already incurred by local authorities, the additional cost would be about £200,000, an amount which would not, however, be reached for several years until the complete service was built up.

The report recommends the setting up of (a) a Central Producers' Board with regional organization ; (b) a Central Dairymen's and Manufacturers' Board and (c) a Joint Milk Council, the latter having powers to provide for co-operation between the two former boards. The Council should consist of the members of the two central boards, with three additional appointed members of whom one should be chairman. A draft scheme for regulating the marketing of milk forms Appendix " A " to the report, and in Appendix " E " a statistical report is given of the imports of milk and milk products into the United Kingdom.

II. & III. Annotations of I.

IV. This comment on the report is reprinted from the National Farmers' Union News Sheet of February 6th, 1933. It urges, *inter alia*, that restriction of certain milk product imports, notably cheese, is an essential part of any plan for reorganizing the milk industry.—F. Bullock.

THERAPEUTICS.

Sergent, E., Donatien, A., Parrot, L., & Lestoquard, F. (1933). Essais de Chimiothérapie des piroplasmoses bovines. [**Chemotherapy in Bovine Piroplasmosis**].—*Bull. Soc. Path. exot.* **26.** 600-605. [5 refs.]

Further experiments have been carried out by the authors with a view to discovering a curative treatment of the bovine plasmoses, that is, infections due to *Piroplasma bigemina*, *Babesia berbera*, *Theileria dispar* and *Anaplasma marginale*. The following products were tested :—gonacrine, trypaflavine (Bayer), ichthargan, stovarsol, trypan blue, piroblue, trypaflavine with ichthargan, Fourneau 309 and 588, hexamethylenetetramine Bayer, antimosan Bayer, sulfarsenol and glucose.

The results were briefly as follows :—

Trypan blue and piroblue proved effective against true piroplasmosis.

Ichthargan was able in certain cases to arrest an acute attack of piroplasmosis, but was without effect when administered during the incubation period.

Against *B. berbera*, ichthargan proved specific, and gonacrine was successful in one case.

Hexamethylenetetramine proved ineffective against *Babesia* ; ichthargan, stovarsol, gonacrine, Fourneau 309 and 588, antimosan, sulfarsenol and glucose water against theileriasis and acridine, gonacrine and trypaflavine against anaplasmosis. Thus at the present time no specific remedy is known for theileriasis caused by *Th. dispar* nor for anaplasmosis.—Ll. E. W. Bevan.

Crane, D. B. (1933). **Rotenone—A New Parasiticide.**—*Cornell Vet.* **23.** 15-31. 6 tables. [14 refs.]

Rotenone which is the active principle of the genus *Degvelia* and other species of tropical fish-poisoning plants, is found in derris root at an average of 2 per cent., but the South American " cube " root *Lonchocarpus nicou* contains over 7 per cent. of rotenone. The writer considers that rotenone given *per os* in gelatin capsules is non-toxic to dogs in amounts up to 0·2 g. per kg. of body weight. Gastritis

and enteritis, however, were caused by doses of 0·1 to 0·2 g. per kg. It was found that young dogs were less depressed or nauseated by large doses than old dogs and that it was less nauseating when given on an empty stomach.

The author states that, as a vermicide, it was more effective after fasting the dog for 18 to 24 hours, and when given in a dosage of 0·05 g. per kg. of body weight it was effective against *Ankylostoma canina*, *Toxascaris limbata* and *Belascaris marginata*. [The author's method of estimating the effectiveness of the drug against the worms was somewhat crude—the faeces were examined without an actual count of the worm eggs present being made, the number of eggs found being expressed as " very numerous, numerous, few or very few." Even accurate egg counts may give the most variable results unless the egg count is correlated with the percentage of dry matter in the faeces]. In a few instances, however, a number of live round worms were passed by the dogs after treatment.

The writer considers that rotenone is only of moderate efficiency against the coccidium of dogs, *Eimerium canis*, and of no value against tapeworms.

In the treatment of follicular mange, however, rotenone gave an unusually rapid recovery in 11 out of 13 cases, the remaining 2 recovering in the usual time. In 9 of the cases the diagnosis was confirmed microscopically. The most suitable formula was found to be :—rotenone 1 g., alcohol 50 c.c., acetone 10 c.c. and water 40 c.c.—the rotenone should be dissolved in the acetone before adding the alcohol and water, and the bottle should be shaken before each application as some of the rotenone may not be dissolved. The solution was rubbed vigorously into the lesions either daily or three times a week and it appeared to be entirely non-toxic and not greasy or dirty to apply.—J. S. Steward.

Mitchiner, P. H. (1933). **The Treatment of Burns and Scalds with Especial Reference to the Use of Tannic Acid.**—*Lancet*. **224.** 233-239. 3 figs., 6 tables. [12 refs.]

In this Hunterian lecture the author deals with the history and statistics of the treatment of burns and scalds and describes in detail the tannic acid method now in successful use at St. Thomas's hospital. Four main causes of death are given :—(a) shock ; (b) toxic (histamine) absorbtion within the first 24 hours of injury ; (c) serum effusion, which may amount to 70 per cent. of the blood volume and (d) toxaemia.

As tannic acid solution is unstable, in order to have it readily available, the following formulae have been prescribed for storage in powder and tablet forms :—

Powder	Tablet
Tannic Acid—17½ grains.	Tannic Acid—17½ grains.
Perchloride of mercury—½ grain.	Perchloride of mercury—½ grain.
	Boric Acid—1 grain.

In each case the mixture is dissolved in 2 oz. of warm water immediately before use, yielding a 2 per cent. solution.

Treatment.—Briefly, the site of the injury is surgically cleansed and swabbed with ether, the patient being under morphine narcosis. A compress composed of six layers of sterile gauze, or three layers of lint, thoroughly soaked in tannic acid solution is evenly applied to the wound. Movement is restricted until the coagulum has formed and the dressing is left in position for two to three weeks, the only symptoms warranting its removal being toxaemia or pyrexia. Removal of the dressing may be rendered painless by spraying tannic acid between the compress and the skin.

A satisfactory solution for the treatment of ulcers caused by non-epithelization is :—

purified alum	20 grains.
zinc sulphate	10 ,,
glycerol	7 fluid oz.
water	to 1 pint.

The rationale of the method is fully expounded.—EDWARD F. PECK.

I. HEILBRON, I. M., HESLOP, R. N., MORTON, R. A., WEBSTER, E. T., REA, J. L., & DRUMMOND, J. C. (1932). **Characteristics of Highly Active Vitamin A Preparations.**—*Biochem. J.* **26.** 1178-1193. 4 figs., 8 tables. [14 refs.]

II. HEILBRON, I. M., MORTON, R. A., & WEBSTER, E. T. (1932). **The Structure of Vitamin A.**—*Ibid.* 1194-1196. 1 fig. [7 refs.]

III. COWARD, Katherine H., DYER, F. J., & MORTON, R. A. (1932). **The Determination of Vitamin A in Cod-Liver Oils, (A) biologically, (B) chemically, (C) physically, with a Statistical Examination of the Results. II. Further Evidence that the Intensity of Absorption at 328$m\mu$. gives the Best Agreement with the Biological Measure of Vitamin A in Cod-Liver Oils.**—*Ibid.* 1593-1600. 8 tables. [5 refs.]

Three papers abstracted together to indicate recent advances in the chemistry of vitamin A.

I. This deals with the constitution of vitamin A, for which a structural formula was recently suggested by KARRER and collaborators [KARRER, MORF and SCHÖPP. (1931). *Helv. chim. Acta.* **14.** 1431 ; see also (1932). *Lancet.* **222.** 251]. The richest vitamin A products, prepared independently by KARRER and by the authors, from mammalian and fish livers, are qualitatively and quantitatively indistinguishable in respect of ultra-violet absorption. Preparations have been obtained, in a relatively high state of purity, and although the failure to prepare crystalline derivatives makes it difficult to compel assent to claims for strict chemical isolation the experimental data indicate that at least there are no gross contaminants. The formula suggested may be written empirically as $C_{20}H_{30}O$, which corresponds to a molecular weight of 286 as against the value of 320 ± 15 found experimentally. The extinction coefficient of the 328 $m\mu$ band [see note below] is of the correct order to be expected from the constitutional formula suggested by KARRER.

II. Discusses the structure in further detail and records the isolation of 1 : 6 dimethyl naphthalene (in good yield) by the dehydrogenation of vitamin A concentrate. This definitely establishes the terpenoid structure of the vitamin and proves the presence, in the richest concentrates, of a substance possessing a constitution which, as far as the 14th carbon atom, must be identical with that advanced by KARRER for vitamin A.

III. The third paper deals with the assay of oils for vitamin A potency, and aims at substituting a simple physico-chemical method for the laborious biological method (rat feeding).

Examination of cod liver oils by the biological, chemical and physical methods [see this *Bulletin.* **2.** 673.] indicates that the intensity of absorption at 328 $m\mu$ by the oil itself gives the best measure of the vitamin A value—better than the "blue values" obtained with antimony trichloride. A final note to the paper, however, adds that this measure is reliable only for determining vitamin A in fresh oils or oils containing little free fatty acid. Free fatty acids may show strong

absorption at 317 $m\mu$ and this interferes with the measurement of absorption at 328 $m\mu$.

[NOTE. For the benefit of readers unaccustomed to the notation used for very small measures of length, or puzzled by the use of $m\mu$ by some authors and $\mu\mu$ by others, the following recapitulation may serve to recall the mathematically correct nomenclature :—

μ stands for the prefix " micro- " signifying 10^{-6} or the millionth part of the unit to which it is attached (Oxford English dictionary usage) ; also for micron or 10^{-6} metre—equivalent, in microscopist usage, to a thousandth of a millimetre.

$m\mu$ stands for a millimicron, i.e. a thousandth of μ, or 10^{-9} metre. Since the meaning is suggested by m there can be no ambiguity in usage.

$\mu\mu$ stands for the prefix micromicro, the second power of μ or billionth (in the English sense) of the unit ; also for micromicron, i.e. 10^{-12} metre (the usage in Dorland's medical dictionary).

Logically, therefore, a denomination such as 328 $m\mu$ should be the same as 328,000 $\mu\mu$ or 0·328 μ. But this rigorous nomenclature is not consistently adopted and $\mu\mu$ is often used as synonymous with $m\mu$ i.e. as meaning 10^{-9} metres. The confusion over "micromicron" is not surprising when it is remembered that even the common word " billion " (etymologically bi-million = second power of million = 10^{12}) means a million million in England but a thousand million in America.

An illustration of such indifferent usage can be found by comparing two recent publications " Vitamins. A Survey of Present Knowledge."—Medical Research Council (1932), and " Recent Advances in Biochemistry."—published by J. A. Churchill. (1931). Discussing the absorption bands of irradiated ergosterol the former, on page 76, correctly refers to 279 $m\mu$ while the latter, on page 299, more loosely refers to 280 $\mu\mu$. Indeed certain books (e.g. the little book on " Artificial Sunlight " written for nurses by Vaughan-Cowell) expressly state that the millimicron may be written either $m\mu$ or $\mu\mu$.

So long as the reader is familiar with the real order of magnitude under discussion no serious confusion can arise but if the unit is used in an unfamiliar connection the meaning may be vague and the stricter dictionary usage is therefore preferable.

It may also be recalled that the Angström unit written Å, and commonly used by radiologists, is equivalent to one-tenth of a millimicron ($m\mu$) so that the range of wave-lengths of the visible spectrum from red to violet may be written either 700-400 $m\mu$ or 7,000-4,000 Å.

Whilst on this topic it may also be useful to recapitulate a few of the common facts concerning radiant energy or electromagnetic waves.

Sometimes a wave is described in terms of its length (from crest to crest) and sometimes in terms of its " period " or " frequency " or rate of vibration e.g. the wave-length upon which the Daventry radio transmitter operates is 1,554 metres or 193 kilocycles (193,000 oscillations per second). At the other extreme, for exceedingly short waves of enormously rapid vibration and great power of penetrating solid objects the terms " hard " and " soft " are often used and the rays described by indicating the thickness of metal they are capable of penetrating e.g. the cosmic rays (Millikan rays 0·00007 – 0·00004 $m\mu$) reaching the earth from outer space can penetrate six feet of lead although a mere film of lead completely stops the long waves used in wireless transmission and a thin metal shield is sufficient to protect against X-rays which penetrate flesh with ease.

When waves are described in terms of their " period " or " frequency " the word octave is sometimes used (by analogy from musical notation) to describe

a set of waves such that the frequency of the highest is exactly twice that of the lowest. Thus the range of colour vision of the average human eye is almost exactly one octave, corresponding to waves pulsating at the rate of 375 billion times a second (about 700 $m\mu$ in length) at the red end of the visible spectrum to 750 billion times a second (about 400 $m\mu$ in length) at the violet end ; waves of intermediate frequency arouse consciousness of all other colours (white light being of course a mixture of all the waves within the octave) while waves lying outside these limits do not affect the retina in such a way as to be interpreted by the brain as " colour."

Although all waves in the ether travel at the same enormous speed (300 million metres per second) they may have any conceivable wave-length and corresponding frequency of oscillation. The investigated range may roughly be divided as follows :—

(1) Very long (many miles) waves of slow oscillation produced, for instance, by a coil of wire rotating in a magnetic field and detected by their mechanical or electro-magnetic effects.

(2) The Hertzian waves ranging from about 30,000 metres down to wave-lengths so short that the millimetre and micron become more convenient units of measurement. They may be generated by spark-gap discharges or by " oscillating valves " and detected by a " coherer " or by conversion into measurable alternating electric currents. They cover about 28 octaves and the range of wave-lengths from 10 metres to 2,000 metres is in common use for wireless transmission —600 to 2,000 metres being the " radio long wave band," 200 to 600 metres the " medium band " and 10 to 100 metres the " short band." Still shorter waves, more conveniently expressed in centimetres, are used for certain forms of wireless signalling. These waves, of course, do not themselves affect the ear but are the " high frequency energy carriers," the much lower " sound frequencies " being superimposed upon the selected " carrier wave " by " modulation," recovered by the receiving instrument as electric current of varying potential and reproduced as sound by the ear-phones or loud speaker.

(3) Below the shortest Hertzian waves come the " infra-red " radiations, covering about nine octaves and conveniently measured in terms of μ. This range is usually given as 800 $m\mu$ to 100 μ or eight thousand to a million Angström units. They are emitted by hot bodies and are measured by rise of temperature of objects upon which they fall, or by a " thermo-electric couple." The octaves of higher oscillation, or shorter wave-length, are detectable by the sensory areas of the skin as heat, and by photographic effects on specially prepared plates. They are absorbed by all solid objects but relatively little by dry air (diathermic). A few feet of water blocks them completely and a thickness of quartz crystal, which allows light to pass through freely, absorbs the heat rays altogether.

The rays of the sun which reach the earth are rarely longer than 1,400 $m\mu$ except in the high Alps where they may survive up to about 2 μ. The longer solar radiations are absorbed by the atmosphere, the shorter ones, down to about 185 $m\mu$ reaching the earth at sea-level on a clear day.

(4) Just below the infra-red radiations or heat rays come the visible red radiations of wave-length about 700 $m\mu$, and all wave-lengths down to about 400 $m\mu$ (violet light) are then directly detected by the retina of the eye as receiving instrument—about one octave if expressed in terms of frequency. These are the " light rays " which can be readily diffracted by glass prisms or finely-ruled gratings so that white light is easily divided into its component rays to give the familiar " visible spectrum." Heat rays are diffracted beyond the red end and, although invisible, can still be focussed by a lens to a hot point. Rays below 400 $m\mu$ (actinic)

are diffracted beyond the violet end and, although invisible, can still be detected by their chemical action on a photographic plate, so that it is easily possible to take a photograph in the dark although the shading effects then look unfamiliar.

Light rays are of course emitted by all bodies as soon as they reach a certain temperature—a sufficiently hot solid glowing first red and finally white (more rapid molecular motion) as the shorter rays are emitted along with the longer ones.

(5) By convention the rays from 400 $m\mu$ down to 14 $m\mu$ are termed the ultra-violet range. Their " frequencies " cover about 5 octaves, middle ultra-violet corresponding to about 6×10^{15} (six thousand billion) oscillations per second. Of these the waves of length 380 $m\mu$ to 296 $m\mu$ are capable of penetrating a considerable thickness of human skin and are regarded as having the most beneficial therapeutic effects. The rays of wave-length around 300 $m\mu$ are the ones supposed to assist the body in synthesizing vitamin D. Rays above 380 $m\mu$ have less pronounced biological effects although in treating certain skin diseases the therapeutic band is extended right up into the infra-red region. Rays from 296 $m\mu$ down to about 210 $m\mu$ have a powerful germicidal effect, are absorbed by the outermost layer of the skin and may cause blistering and tissue necrosis.

Dust particles in the atmosphere absorb the shorter ultra-violet rays so that solar radiations below about 290 $m\mu$ rarely reach the earth. The atmosphere of industrial towns may cut off the greater proportion of ultra-violet rays from the sun, so destroying much of the therapeutic value of sunlight. Ordinary window glass generally stops rays shorter than 340 $m\mu$ although " vita glass " (when new) passes rays as short as 275 $m\mu$ and sheets of quartz crystal pass still lower wave-lengths.

A mercury vapour lamp gives radiations very rich in ultra-violet rays. A tungsten arc lamp supplies radiations rich in infra-red as well as in ultra-violet rays. A carbon arc lamp gives abundant infra-red radiations with very little ultra-violet.

(6) The 14 octaves beyond the ultra-violet rays are termed X-rays, are generated by sudden stoppage of fast moving electrons as in any of the well-known Roentgen tubes, and are detectable by their chemical effects on photographic plates, in ionizing gases, and by other means. They penetrate all matter to a certain extent although they are stopped by relatively thin pieces of metal. They are not reflected or refracted like ordinary light rays but may be diffracted by appropriate means. Their range of wave-lengths is usually given as 1·4 to 136 Å (i.e. 0·14 to 13·6 $m\mu$) the longer waves being termed " soft X-rays " and the shorter waves, of greater penetrating power, being termed " hard X-rays." Their frequencies range from about 24×10^{15} to about 153×10^{16} oscillations per second.

(7) Still shorter than the X-rays come the still harder gamma rays, extending over about three octaves and emitted when atomic nuclei disintegrate, as in the case of the spontaneous disintegration of radium and other radio-active elements. Their wave-lengths range from about 0·06 Å to about 1·4 Å. Their properties are similar to those of X-rays but they have much greater penetrating power.

(8) Much shorter still and of still more enormous rate of oscillation are the " cosmic rays " which enter the earth's atmosphere from outer space and which are supposed to arise in the actual annihilation of matter—destruction of protons and electrons—although their origin is not yet completely settled. They include the " Millikan rays " of wave-length 0·0007 to 0·0004 Å capable of penetrating 6 ft. of lead. The destructive power of cosmic radiation is enormous, being stated to break up about 20 atoms in every cubic inch of the earth's atmosphere and millions of atoms in each of our bodies every second—whether for good or ill is not yet known].—H. H. Green.

POISONS AND POISONING.

I. STEYN, D. G. (1932). **A Study of the Factors concerned in the Determination of the Toxicity of** *Cotyledon orbiculata* **L.**—*18th Rep. Direct. Vet. Serv. & Anim. Indust. Union of S. Africa.* Part II. pp. 899-938. 6 figs., 13 tables, 7 graphs. [11 refs.]

II. RIMINGTON, C. (1932). **Isolation and Chemical Examination of the Poisonous Principles of** *Dimorphotheca spectabilis* **Schltr. and** *Dimorphotheca zeyheri* **Sond.**—*Ibid.* pp. 955-972. 3 figs., 1 table. [16 refs.]

I. Various species of cotyledon have long been incriminated as the cause of the disease " krimpsiekte " in goats and sheep in South Africa. The author now discusses the variability of toxin content of a single species from different localities and records experiments designed to throw light on the cause of the variation.

In an earlier experiment, a specimen of *Cotyledon orbiculata* had been broken into two parts, one of which was planted in sandy soil and the other in heavy soil. In the course of five and a half months the former lost half of its toxicity while the latter doubled its poison content. In the experiments now recorded the same species was grown in large pots, under varying conditions of soil, manuring, water content and sunlight. Suitable comparable extracts of the plants were then injected subcutaneously into guinea pigs in doses equivalent to the range 5 g. to 65 g. of the fresh fleshy leaves in order to determine the approximate lethal dose.

As the result of data from 1,156 guinea pigs, the following conclusions were drawn :—(a) immature and mature leaves of the same plant were equally toxic ; (b) specimens of *C. orbiculata* growing beside each other varied considerably in toxicity ; (c) sodium phosphate and sheep manure stimulated the growth of the plant without materially altering its toxicity ; (d) the most toxic period was from November to February (i.e. summer) ; (e) specimens growing in sandy soil in direct sunlight were more toxic at the conclusion of the experiment while those growing in the Onderstepoort black soil were then generally less toxic ; (f) the influence of transplantation was to reduce toxicity for a few weeks ; (g) no definite information was obtained on the effect of sunlight since the species used died out in diffused light—although certain other species (*C. ventricosa* and *C. wallichii*) seem to prefer diffused light under natural conditions.

II. The toxic substance in these two plants is the cyanogenetic glucoside " linamarin " or " phaseolutin," i.e. the glucose ether of acetonecyanhydrin. A new crystalline form is described and the glucoside is therefore dimorphous.

It is readily hydrolysed by an enzyme present in the plants, provisionally termed " linamarase," but is not hydrolysed by emulsin or maltase. *Dimorphotheca spectabilis* was found capable of yielding about 1·7 g. of hydrocyanic acid by enzymic hydrolysis in the fresh state and *D. zeyheri* about 1·1 g. per 100 g. of plant dry weight. The glucoside was not toxic (rabbits) in the unhydrolysed state (dose equivalent to one lethal dose in terms of hydrocyanic acid present) but was markedly toxic when hydrolysed by the enzyme of the plant prior to administration. Dried plant powder (containing both enzyme and glucoside) was toxic at the rate of about 2 g. per 2 kg. rabbit.—H. H. GREEN.

I. STEYN, D. G. (1932). **The Effects of Sulphur on Merino Sheep and their Resistance to Potassium Cyanide Poisoning.**—*18th Rep. Direct. Vet. Serv. & Anim. Indust. Union of S. Africa.* Part II. pp. 597-610. 8 tables, 1 chart.

II. STEYN, D. G. (1932). **Experiments with Potassium Cyanide on Rabbits.**—*Ibid.* pp. 939-945. 3 tables. [2 refs.]

I. Sheep (merino wethers and ewes) were dosed in batches of five, with 5 g.

of sulphur once, three times, and six times weekly, for two years—a fourth batch serving as untreated controls. Records of weight, wool clip and clinical behaviour were kept, and finally two sheep from each batch were tested for resistance to cyanide poisoning. The results showed (a) a definite superiority in weight increase and wool-yield in favour of sulphur feeding ; (b) a reduced degree of worm infestation ; (c) an apparently increased tolerance to potassium cyanide ; but (d) an apparently increased incidence of urinary calculi.

The calculi were confined to the wethers but of eight dosed with sulphur three succumbed to this cause while the two control wethers remained healthy—possibly mere coincidence. The testing of cyanide tolerance refers to possible use of sulphur in preventing one of the forms of " geilsiekte " [local Dutch name for a sheep disease of obscure aetiology] which the author attributes to formation of prussic acid in wilted (sun-scorched) plants, notably *Dimorphotheca cuneata.*

II. White Angora rabbits were shown to be more susceptible than ordinary white short-haired rabbits and dark grey rabbits, to the effects of potassium cyanide administered by stomach tube—the specially bred Angora showing the weaker constitution.

The same dose of potassium cyanide could produce symptoms of varying severity in the same animal at different times. Rabbits at the point of death after a borderline dose made strikingly quick recovery. Some animals appeared to develop a measure of tolerance to potassium cyanide when subjected to preliminary treatment with gradually increasing doses.

Rabbits dosed with sulphur for three successive days before dosing with cyanide were more resistant—although the data were limited to two rabbits on 0·5 g. sulphur, two on 1 g. and two on 3 g., both controls succumbed to the usual M.L.D. of 0·015 g. cyanide per kg. body weight while the two receiving 3 g. of sulphur successfully tolerated twice this amount. The rabbits receiving the smaller quantities of sulphur withstood one but not two M.L.D.—H. H. Green.

PHYSIOLOGY.

Trautmann. (1933). Zur Frage der Resorption des Wiederkäuermagens. **[Absorption by the Ruminant Stomach].**—*Deuts. tierärztl. Wschr.* **41.** 30-31. [Lecture delivered at the 40th Wissenschaftlichem Referierabend at Hanover Veterinary College on the 8th December, 1932].

The author describes his experiments showing that the fore-stomachs of ruminants can absorb water or watery solutions. He prepared fistulae from the rumen, reticulum and abomasum of goats, prepared a parotid fistula and, after emptying the stomach, introduced separately watery solutions of pilocarpine and atropine. The behaviour of the parotid gland indicated clearly that absorption could take place rapidly from each part of the stomach named above.

The same point was proved by the administration of pyridium (a urinary antiseptic) solution directly into the stomach : it was excreted in the urine after as short an interval as 20 minutes. This work reverses the hitherto accepted view that no absorption takes place from the fore-stomachs of ruminants.—J. E.

Smith, P. E. (1932). **The Non-Essentiality of the Posterior Hypophysis in Parturition.**—*Amer. J. Physiol.* **99.** 345-348. [9 refs.]

Extirpation of the posterior lobe of the pituitary gland in rats did not prevent parturition nor lengthen the period of gestation. The conclusion is that the secretion of the posterior pituitary is not necessary for the genesis or the main-

tenance of the birth contraction of the uterus. The experiments do not disprove that some other structure does not supply the oxytocic substance which aids parturition, other workers having shown that the hypothalamus of dogs contains certain amounts of uterine-contracting substances.—J. R. M. INNES.

I. —. (1932). **Vitamins: A Survey of Present Knowledge.**—*Med. Res. Council. Spec. Rep. Ser.* No. 167. pp. 332, 2 appendices. [25 pages refs.] London: H.M. Stat. Office. [8vo.] [6s. 6d.]

II. —. (1932). **Vitamins: A Survey.**—*Lancet.* **223.** 245.

III. —. (1932). **Vitamins and Human Diets.**—*Brit. Med. J.* Aug. 20th. 359.

Publications II and III are annotations of I written from the medical point of view.

The main publication represents an enlarged version of previous reports on "accessory food factors," bearing the new title indicated. In the preface it is pointed out that the task of keeping pace with the growth of the subject can hardly be discharged by further editions and that the Medical Research Council has, therefore, joined with the Imperial Agricultural Bureaux in giving support to *Nutrition Abstracts & Reviews*, which will abstract relevant material as fast as it appears.

The publication itself is as complete as critical selection of bibliography, within prescribed compass, can make it. The fact that the veterinarians may miss certain significant references bearing upon vitamin requirements of the larger domesticated animals, is no criticism of a volume compiled from the standpoints of the physiologist, the biochemist and the medical worker; but perhaps indicates the desirability of a short review from the specifically veterinary angle of vision.

The volume contains so much recent material that it is impossible even to indicate the gist of it in a short abstract, but it may be mentioned that page 94 provides a concise summary of knowledge on vitamin C requirements of different animals, that references are made to the cow calf and goat, and that the index refers to milk about 35 times.

There is much new material on the vitamin B complex subdivided into the fractions B_1, B_2, B_3, B_4, and about a dozen pages are devoted to the relations between vitamin D and dental tissues.

Of the 11 chapters, pellagra receives one to itself, and vitamin E another. Appendix I gives the distribution of vitamins in foodstuffs etc., and Appendix II incorporates the Report of the Conference on Vitamin Standards held in London in 1931.—H. H. GREEN.

KLEIN, M. (1933). Sur les rélations entre l'utérus gravide et le corps jaune au cours de la deuxième partie de la grossesse chez la Lapine. **[The Relation between the Gravid Uterus and the Corpus Luteum during the Second Part of Pregnancy in the Rabbit].**—*C. R. Soc. Biol. Paris.* **112.** 819-821. [2 refs.]

When a unilateral pregnancy has been artificially induced and ended after the 15th day, five to eight days later, histological examination of the mucous membrane and the reaction of the muscle to pituitrin of the non-gravid horn show that the corpus luteum has ceased to function. As it is normally persistant throughout the whole of pregnancy, this must be brought about by the presence of the gravid uterus.—J. A. NICHOLSON.

DEMMEL, M. (1933). Der Blutzucker im Sexualzyklus des Rindes. **[The Blood Sugar in the Sexual Cycle of Cattle].**—*Deuts. tierärztl. Wschr.* **41.** 117-119. 4 tables. [23 refs.]

A study of the amount of blood sugar present during the different phases of the sexual cycle of cows. Taking the interoestral period as the normal condition for the purpose of comparison, the blood sugar is found to be increased during oestrus and decreased during pregnancy.

The raising of the sugar content during oestrum begins gradually with the resorption of the yellow bodies and the ripening of the ovarian follicles and reaches its highest point at actual oestrum. After the rupture of the follicles, the blood sugar soon falls to the level of the interoestral period. It is lowest during the formation of the yellow bodies. During pregnancy the sugar is found at its lowest level in the first three months after which it increases and remains level until parturition.—R. G. LINTON.

I. CURSON, H. H. (1932). **Anatomical Studies No. 29. A Further Note on Free-Martinism.**—*18th Rep. Direct. Vet. Serv. & Anim. Indust. Union of S. Africa.* Part II. pp. 1067-1072. 6 figs., 1 table.

II. MARAIS, I. P. (1932). **Anatomical Studies No. 35. On the Origin of an Abdominal Cyst found in a Domestic Hen.**—*Ibid.* pp. 1087-1089. 2 figs. [1 ref.]

I. Some general information from various sources about twinning in South African cattle and the free-martin condition is given.

II. A pedunculated cyst was attached to the dorso-lateral aspect of the cloaca, by a fold of peritoneum enclosing blood vessels. A small subsidiary cyst was present on one side of the stalk. A tubular structure, resembling a small oviduct was attached to the anteroventral aspect of the cloaca. The fully developed oviduct was on the right side, but it is possible that this was the usual left oviduct displaced by the cyst. The cyst may represent degeneration of the bursa of Fabricius. [The histology of the cyst is not described].—GEORGE SLAVIN.

JOSLAND, S. W. (1933). **A Study of the Blood of Healthy Sheep and Cattle in New Zealand.**—*New Zealand J. Sci. & Tech.* **14.** 298-308. 9 tables. [46 refs.]

This is an excellent paper describing biochemical and histological work carried out by the author at the Wallaceville Veterinary Laboratory, Department of Agriculture, New Zealand.

The author deals first with the source of his material, methods of obtaining it and the methods used in determining his results. The paper then presents the result of the estimation of calcium, inorganic phosphorus, sugar, non-protein nitrogen, urea N, creatinine, uric acid, sodium chloride, cholesterol, haemoglobin and the differentiation of leucocytes of sheep and cattle of various ages and both sexes. There are numerous comparative tables showing that the New Zealand figures are quite in accord with those of workers in other countries.

The results have been dealt with statistically.

An appendix describing the type of pasture upon which the cattle and sheep have grazed has been added by the officer in charge of the laboratory.

—C. S. M. HOPKIRK.

I. LEICHSENRING, Jane M., BIESTER, Alice, HÖNIG, Hortense H., FURNAS, Sparkle M., FOSS, Edith S., & ROUTT, M. Virginia. (1932). **Blood Regeneration Studies. II. Observations on the Blood of Normal Dogs with Special Reference to the Measurement of Volume, Erythrocytes, Leucocytes and Nitrogenous Constituents.**—*Amer. J. Physiol.* **99.** 391-397. 2 tables. [29 refs.]

II. PERLSTEIN, M. A., & LEVINSON, A. (1932). **Cerebro-Spinal Fluid in Normal Dogs.**—*Ibid.* 626-630. 2 tables. [9 refs.]

I. In this paper the authors present the data of physical and chemical measurements on the blood of 32 adult dogs, 16 males and 16 females. No significant sex differences were observed and the following averages for animals per unit of live weight were found :—

Total blood volume was 7·18 c.c. and cell volume 3·43 c.c. per 100 g. body weight ; plasma, 52·3 per cent. ; red cell count, 7·17 millions per c.mm. ; red cell diameter, 7·0 μ ; white cell count, 8·76 thousands per c.mm. of blood. The " weighted average " per 100 c.c. of blood for total protein was 19·64 g. ; for haemoglobin, 14·11 g. ; for non-haemoglobin protein, 6·64 g. ; for non-protein nitrogen, 35·4 mg. ; urea nitrogen, 11·04 mg. ; creatinine, 1·52 mg. ; amino-acid nitrogen, 10·77 mg.

II. This work on the cerebrospinal fluid in normal dogs has been carried out to determine the normal values with regard to amount obtainable, pressure and cell count, also to obtain the comparative values of the fluid obtained from the cistern and from the lumbar subarachnoid space. It was found to resemble the cerebrospinal fluid of the human subject in general characteristics in that it is clear, colourless, limpid and devoid of bactericidal activity. The amount of fluid obtained in 45 cistern punctures ranged from 1 to 8 c.c. with an average of 3·4 c.c. and in 27 lumbar punctures it ranged from 0·5 to 5 c.c. with an average of 2·2 c.c. The pressure of the fluid under morphine-ether anaesthesia ranged from 3 to 23 cm. of water with an average of 14·3 cm. in 37 cistern punctures and it ranged from 5 to 18 cm. with an average of 12·3 cm. of water in 22 lumbar punctures. The cells in normal fluid are all lymphocytes and the number varied between 0 and 10 with an average of 2·2 per c.mm. in 58 samples obtained from the cistern. In 39 lumbar punctures the figures were 0 to 10 with an average of 4 per c.mm.

—D. R. WILSON.

WILLS, Lucy. (1932). **Spontaneous Fluctuations in the Reticulocyte Count in Pigeon's Blood.**—*Brit. J. Exp. Path.* **13.** 172-175. 3 charts. [4 refs.]

LE GUYON, R., & HOUOT, A. (1932). Variations des leucocytes dans le sang d'animaux sains au cours de l'abcès de fixation. **[Variations of the Leucocytes in the Blood of Healthy Animals with " Fixation Abscess "].**—*C. R. Soc. Biol. Paris.* **109.** 222-225.

GRAY, L. (1932). **Lymphatic Leukemia.**—*J. Amer. Vet. Med. Ass.* **80.** 106-108. 1 fig.

The communication by Wills is an account of observations made on a number of pigeons kept under standard conditions for 70 days. The author's findings were contrary to the observations of VAUGHAN, viz. that certain pigeons kept on a diet of mixed grains and beans maintained steady weights and showed reticulocyte counts not above 12 per cent. Such pigeons were suitable, according to VAUGHAN, for the estimation of the haemopoietic activity of various liver fractions. The author concludes that the variations in the percentage of reticulocytes in pigeons depend upon factors other than those operating in man and that great caution is necessary in the interpretation of results in such observations.

The article by le Guyon and Houot is a detailed account of observations made on the leucocytes of guinea pigs in which a fixation abscess has been established. Differential counts were made at hourly intervals after injection of turpentine. In the first few hours, increase in the leucocyte figure was due to increase in the number of polymorphonuclears ; later, there was decrease in the number of polymorphs, but increase in the number of monocytes.

The third communication is a description of a case of lymphatic leucaemia in a recently calved cow. The first signs were swelling above the posterior border of the mammary gland, emaciation, loss of appetite, decrease in milk production, enlargement of superficial lymphatic glands, dyspnoea, signs of emphysema of the lungs and rise of temperature up to 105·6°F. which persisted until death occurred. The blood count was erythrocytes 6,000,000, leucocytes, 11,000 of which 55 per cent. were lymphocytes, 15 per cent. monocytes, 26 per cent. neutrophiles and 4 per cent. eosinophiles. The haemoglobin figure was 50. On *post-mortem* examination there was found great enlargement of all lymphatic glands, catarrhal and purulent pneumonia, emphysema of the lung and fibrinous pleuritis.
—C. McG.

HERMAN, W. (1932). Naczynia tętnicze w wymieniu bydla rogatego. [**The Arteries in the Mammary Gland of the Cow**].—*Rozprawy Biol.* **10.** 1-25. 9 figs. [15 refs.] [Summary in German : abst. from orig.]

The author studied the anatomy of the arteries of the mammary gland of the cow. The results are in accordance with those of ZIETSCHMANN, except that Herman found six different types of branching of arteries, while ZIETSCHMANN recorded only two different types.—E. PRIBYL (BRNO).

CUNNINGHAM, I. J. (1933). **Some Observations on the Calcium and Phosphorus Metabolism of the Sheep.**—*New Zealand J. Sci. & Tech.* **14.** 281-287. 4 tables. [3 refs.]

The author has described the results of two experiments on sheep, the first to be carried out with metabolic cages in New Zealand. The sheep were fed on hay of a low nutritive value, deficient in phosphoric acid and nitrogen.

In the first experiment, potassium dihydrogen phosphate was added to the ration, the result being a depression of the calcium oxide balance from a positive to a negative one while the negative nitrogen and phosphoric acid balances were unaffected.

In the second experiment, dried blood and gelatin were added as a source of nitrogen. This improved the calcium, phosphoric acid and nitrogen retention. Nauru rock as a source of phosphate was shown to be unsuitable. The tables illustrate the analyses carried out.—C. S. M. HOPKIRK.

FRASER, A. H. H. (1932). **The Reciprocal Relationship of Calcium and Inorganic Phosphorus of the Blood of Sheep.**—*Biochem. J.* **26.** 2166-2168. 3 tables. [7 refs.]

HOWLAND and KRAMER (1923) showed that in rickets the concentration product of calcium and inorganic phosphorus falls below a certain critical level ; this suggests a fundamental relationship between the levels of calcium and inorganic phosphorus in the blood. BOURNE and CAMPBELL (1932) demonstrated that in rabbits the concentrations of these two substances bear a reciprocal relationship to each other. This was confirmed by DUPRÉ and SEMEONOFF (1931). On the other hand, the author points out that THEILER, GREEN and DU TOIT (1927) found that in cattle the blood calcium remained normal even with an inorganic phosphorus of one quarter the normal. Later, AUCHINACHIE and FRASER (1932), having fed sheep on a calcium-deficient ration, found that an abnormally low serum calcium may be accompanied by an abnormally high inorganic phosphorus and that there was evidence of a reciprocal relationship between the calcium and inorganic phosphorus of the blood of sheep.

In the present work the author fed five sheep on a calcium-deficient diet and

five other sheep on the same diet plus 5 c.c. of cod liver oil per head per day. Periodic simultaneous estimations were made of the blood calcium and inorganic phosphorus. It was clearly shown that when sheep kept under outdoor conditions are fed on a basal ration deficient in calcium, or such a ration supplemented with cod liver oil, the Ca × P product of HOWLAND and KRAMER tends to approach a constant, in spite of wide variations in serum calcium and blood inorganic phosphorus caused by differences in the diet. This constancy evidently depends upon the reciprocal relationship of the calcium and phosphorus in the blood, the level of the phosphorus rising as that of the calcium falls, and *vice versa*. In discussing the results of the experiment the author suggests that this reciprocal relationship follows the utilization of mineral reserves from the bones ; if calcium is drawn from bone then there must be a simultaneous withdrawal and transference to the blood of phosphorus, calcium being chiefly present in bone in the form of calcium phosphate. This view is supported by other workers on swine and sheep, who have demonstrated that neither a calcium nor a phosphorus deficiency in the diet alters the percentage composition of the bones.

—R. G. LINTON.

SHAW, J. N. (1933). **A Liver Function Test in Sheep.**—*J. Amer. Vet. Med. Ass.* **82.** 199-204. 3 figs. [4 refs.]

As the author says, the use of dyes to determine the excretory function of livers in human beings and dogs is not new. The purpose of this work was to test the excretory function of the liver of sheep infested with *Fasciola hepatica* and to determine whether the administration of carbon tetrachloride reduced hepatic excretion. It has been shown previously that the dye, rose bengal, is eliminated from the blood stream of dogs and human beings by the liver only ; it is cheap and practically non-toxic. A 1 per cent. solution of the dye was made by dissolving it in normal saline and adding enough dextrose to make a 6 per cent. dextrose solution ; when sterilized the solution is ready for use. Ten c.c. of the solution will colour the plasma of an average sheep. Two minutes after injection 10 c.c. of blood was withdrawn which, when mixed with potassium oxalate solution, served as a normal. Eight minutes after injection, a second sample was withdrawn. The samples were centrifuged and to one part of the supernatant fluid was added two parts normal saline. The solutions were then compared in a colorimeter. A 50 per cent. elimination at eight minutes is taken to indicate normal liver function.

The author tested the method on 55 sheep and one rabbit, 38 of the sheep being supposedly normal and 17 with some evidence of liver disease. Of the 17 abnormal sheep seven were passing fluke eggs in their faeces, five had been fed with viable cercariae and at a later date three of them discharged ova in the faeces ; two had been dosed with carbon tetrachloride, three were suffering from so-called " pregnant ewe paralysis " and the rabbit was discharging coccidia in the faeces. Autopsies were made on 12 sheep at varying lengths of time after the injection. The author concluded that, except in one instance, the excretory function in livers of sheep infested with immature and mature *Fasciola hepatica* was not affected, according to this test, except in one instance. Carbon tetrachloride in excess dosage did not damage the liver to the extent that injury could be detected by the test. The rabbit with gross lesions of coccidiosis proved negative to the test. On the other hand the test showed that in the case of so-called " pregnant ewe paralysis " the excretory function of the liver was markedly reduced.—R. G. LINTON.

OLIVER, Jean R., & LUND, Edna M. (1933). **Cellular Mechanisms of Renal Secretion. A Study by the Extravital Method. I. The Structural Phase**

of the Secretory Mechanism. II. The Functional Phase of the Secretory Mechanism.—*J. Exp. Med.* **57.** 435-458 and 459-483. 3 text figs., 37 figs. on 4 plates, 1 plate, 13 tables. [27 refs.]

I. The experiments described combine a morphological and a physiological examination of the activity of the isolated perfused frog kidney. The discovery that neutral red is eliminated by the isolated perfused kidney through the tubular epithelium and not through the glomeruli has greatly assisted the study of the secretory mechanism. After perfusion and suitable staining, the secretion of neutral red was seen to be accompanied by a disappearance of filaments and the formation of granulovacules in the mitrochondrial apparatus of the renal tubule cells. Absorptive processes do not produce these effects.

II. Using the same experimental methods as before, it was found that the elimination of neutral red by the renal epithelium consists of a direct and an indirect secretion. The direct secretion is concerned with the permeability of the two cell membranes and is very easily upset. The indirect secretion is concerned with the collection of the dye in the protoplasmic constituents of the cells and its slow liberation, which continues even when the cells are severely damaged.

—J. A. Nicholson.

Wilkerson, V. A., & Gortner, R. A. (1932). **The Chemistry of Embryonic Growth. III. A Biochemical Study of the Embryonic Growth of the Pig with Special Reference to Nitrogenous Compounds.**—*Amer. J. Physiol.* **102.** 153-166. 3 tables. [23 refs.]

Working on 1,552 pig embryos (Armour Packing Co.) varying in length from 2 mm. to 240 mm. and divided into 13 groups for classification and analysis, the authors present data with respect to weight, water content, ash, nitrogen, glutathione, complete van Slyke partition (12 nitrogenous constituents), total sulphur and tyrosine.

For the numerous detailed protocols the original must be consulted, but points of general interest may be abstracted as follows :—

(1) Certain of the variations at different stages of development appear to have a recapitulatory significance as, for instance, the decreasing content in arginine and histidine with rising lysine, a distribution corresponding to rise in the scale of animal evolution.

(2) A relationship between embryonic chemistry and tumour chemistry is indicated.

(3) The chemical course of embryonic development appears to be governed by the inherent nature of the embryo and specific selective absorption of the placenta, irrespective of maternal nutrition.

(4) Gradation of changes can be studied just as well in mammalian embryos as in closed embryonic systems such as the egg, and the longer prenatal period may sometimes offer certain advantages.—H. H. Green.

Venulet, F., & Goebel, F. (1932). Sur l'origine de la vitastérine D dans l'organisme. [**On the Origin of Vitasterine D in the Organism**].—*C. R. Soc. Biol. Paris.* **111.** 1026-1028.

An enquiry to find whether the antirachitic factor was present in the diet or was made in the alimentary tract by bacteria. The excreta of normal rats shows the presence of pro-vitamin D. The bacterial origin of this is doubtful, because the excreta of rats deprived of vitamins in the diet is inactive, even after irradiation, but the McCallum diet has the power of altering the intestinal flora thus rendering impossible the production of pro-vitamin D. Dried and powdered

rat tissue when added to McCallum diet does not prevent rickets, but does so if it has been irradiated. This supports the view that the vitamin is synthetized in the animal tissues.—HENRY DRYERRE.

BISHOP, F. W., CARPENTER, C. M., & WARREN, S. L. (1932). **Studies on the Physiological Effects of Fever Temperatures. I. A Description of a Series of Constant Temperature Water Baths for the Determination of the Thermal Death Time of Bacteria.**—*J. Exp. Med.* **56.** 719-723. 3 figs.

BOAK, Ruth, CARPENTER, C. M., & WARREN, S. L. (1932). **Studies on the Physiological Effects of Fever Temperatures. II. The Effects of Repeated Short Wave (30 Meter) Fevers on Growth and Fertility of Rabbits.**—*Ibid.* 725-739. 2 graphs, 2 plates, 1 table. [14 refs.]

The first paper is a technical description of a series of six water-baths in one unit, set at temperatures ranging from 37° to 42°C. for the purpose of studying the thermal death time of bacteria and body tissue.

The second paper describes experiments dealing with the repeated elevation of the body temperatures of male and female rabbits from 41° to 42°C. by exposure in the electrostatic field of high frequency 30 m. waves [radio waves]. The experiments were extended through a period of gestation. The repeated elevation of temperature failed to injure the growth or to interfere with mating, fertilization and the growth of young *in utero*. The fevers produced are similar to those occurring in disease processes, the short radio waves producing internal heat which is essentially different from the elevation of body temperature by warm air and baths. The production of fever temperatures by short radio waves is a controllable and safe procedure and stimulates general metabolism.

[Fever temperatures are injurious to many pathological micro-organisms in the body, particularly the spirochaete of syphilis. This fact was founded on the classical work of WAGNER-JOUREGY on the treatment of dementia paralytica by the injection of *Plasmodium malariae*, a dramatic solution to the problem of treatment of a disease until then remarkable in its resistance to chemotherapy. This new therapy was considerably enhanced by the discovery of WHITNEY that fever temperatures could be induced and controlled by the action of short radio waves, the method of inducing fever by malaria in the treatment of general paralysis not being without its dangers. This advance in therapeutics which destroyed centuries of medical dogma has fundamental importance in human and veterinary medicine as it may become a valuable weapon in the treatment of diseases other than syphilis. The above papers were a logical sequence to these forementioned discoveries and deal with experiments which consolidate the value of fever temperatures as a therapeutic measure. Those interested should consult two further papers by the same authors—*J. Exp. Med.* (1932). **56.** 741 and 751.—which deal with the thermal death time of *Treponema pallidium* in culture and in active syphilitic lesions in rabbits].—J. R. M. INNES.

TECHNIQUE.

TODD, E. W., & HEWITT, L. F. (1932). **A New Culture Medium for the Production of Antigenic Streptococcal Haemolysin.**—*J. Path. & Bact.* **35.** 973-974. [4 refs.]

The medium is easy of preparation in bulk and consistently yields haemolysin of high lytic and antigenic potency. [For details see original]. To horse broth of normal strength is added 2 per cent. of Difco proteose peptone, 0·2 per cent. of dextrose, sodium bicarbonate and sodium chloride respectively, and 0·1 per cent.

of disodium phosphate. The pH is carefully adjusted to 8·0 and the whole filtered into Winchester quarts (1,500 c.c.). Each is warmed to 36°C., inoculated with 2·0 c.c. of a 24-hour culture and incubated upright for 15 hours at 36°C. The filtrate from this (pH 6·6) is stored in the cold and reduced *in vacuo*, immediately before use, by adding 1·0 per cent. normal sodium hydroxide and 0·1 per cent. of finely powdered sodium hydrosulphite. After half an hour *in vacuo*, 0·1 c.c. of the reduced product will lyse 0·5 c.c. of 5 per cent. rabbit cells and traces occur with 0·005 c.c. The first fraction of the filtrate is inactive.

By inoculation of horses, antiserum has been obtained which neutralized 100,000 M.H.D. per c.c.—A. W. Stableforth.

Green, R. (1932). **A Method of Preparing and Staining Thick Blood Films for the Diagnosis of Malaria.**—*Trans. Roy. Soc. Trop. Med. Hyg. London.* **26.** 275-282. [1 ref.]

The search for malarial parasites in blood is undoubtedly made easier by the use of thick films which have been properly prepared and stained. This note describes a method, embodying various steps recommended by text-books and by individual workers, which has been evolved and has yielded good results over a long period. Details of practical importance are given of the technique and methods for using Giemsa's and Leishman's stains are described. The necessity for using buffered water in the dilution of these stains is emphasized. The methods described might prove helpful to veterinary protozoologists.—Ll. E. W. Bevan.

I. Proger, L. W. (1932). **A Simple Method of Labelling Museum Jars.**—*J. Path. & Bact.* **35.** 977-978. 1 fig.

II. Bhalerao, G. D. (1932). **A New Method of Mounting Small Museum Specimens.**—*Ind. J. Vet. Sci. & Anim. Husb.* **2.** 310. 1 plate.

III. Cassata, C. (1932). Une nouvelle méthode facile et économique pour la conservation des préparés de Microscopie et de Parasitologie. [**A Simple and Inexpensive New Method of Mounting Microscopical and Parasitological Preparations**].—*Boll. sez. ital. Soc. Internat. Microbiol.* **4.** 11-12.

I. This article describes in detail a method of labelling rectangular or round museum jars with black cellulose enamel letters upon a white cellulose enamel background, making use of a draughtsman's stencils and masks, sprays, and spray pump. The method is said to be inexpensive and easily applied, and to provide clear and durable labels.

II. This method consists in placing small objects in thick melted gelatin spread as a paste on a glass or celluloid sheet and then hardened in 4 per cent. formalin for about an hour. The mounted specimen is then placed in Kaiserling solution II in a museum jar in the ordinary way. [It is not clear why the author describes the method as " new "].

III. Following Porzio's method for mounting histological preparations without cover glasses, Cassata has tried a similar solution for mounting parasites, their eggs, stained films of bacteria, etc. The solution is amyl acetate 25 c.c., methyl alcohol 25 c.c., dry celloidin 50 g. Parasites are arranged on a slide, dried in the incubator and covered with a few drops of the solution. A watch-glass is placed over the specimen to keep it free from dust and in an hour the preparation has set hard. In the case of worm eggs, overdrying prior to applying the solution must be avoided. The mountant decolourizes bacteria except *M. tuberculosis* in sputum.—S. H. Gaiger.

MISCELLANEOUS.

LORD BLEDISLOE. [P.C., G.C.M.G., K.B.E., D.Sc., M.A., M.R.A.C., Governor General of New Zealand]. (1932). **A Conspectus of Recent Agricultural Research.**—The Cawthron Lecture. pp. 62. [3 refs.] Wellington: Whitcombe and Tombs, Ltd. [8vo.] [1s.]

Lord Bledisloe's lecture covers a wide field of observation and research concerning problems affecting the agricultural and pastoral industries.

Of more particular interest perhaps to veterinarians are the remarks on mineral deficiencies and the disturbances to animal health arising therefrom. The lecturer recalls the work initiated in New Zealand upon the progressive anaemia to which ruminants depastured upon iron deficient soils in certain localities are prone to succumb—a condition witnessed also in parts of Scotland, East Africa, and Tasmania. The profound changes following upon phosphate deficiency in New Zealand and other parts of the world are alluded to as well as the effects of copper upon haemoglobin synthesis, manganese upon reproductive activity, and iodine upon development, milk secretion and thyroid insufficiency.

Pigs are described as the species of mammals most in need of adequate supplies of mineral matter. "In proportion to body weight a pig's mineral requirements are perhaps only exceeded by those of a hen." Reference is made to the role of vitamins (such as that present in cod liver oil) and ultra-violet light in promoting mineral absorption.

A point emphasized by the lecturer is the influence of dietary upon the health of a community. Ignorance of dietetics and the consumption of improperly balanced rations both in human beings and animals is, no doubt, a fruitful source of ill-health.

Some interesting observations on fertility include reference to the inhibiting effect of too early service in the case of mares. "Experiments have proved that if the mating takes place within three days of the end of heat, 90 per cent. fertility results, if between 4 and 6 days, 45 per cent., if between 7 and 9 days, 20 per cent., and if ten days or more it fails altogether." Fertility in the case of travelling stallions, it is stated, averages 54 per cent. The dying off of fertilized eggs with consequent small litters is a common source of economic loss with sows. Inbreeding may lead to foetal atrophy and as many as 60 per cent. of the eggs which are shed perish in this way before the young are born. Inbreeding is not itself the cause, but it brings to light any latent or undesirable factor already existing in the strain.

In connection with poultry genetics, the author refers to the work of PUNNETT at Cambridge who established a method of sex determination at birth. Further developments have resulted in the production of an auto-sex-linked breed which when mated with a similar breed gives cocks and hens of markedly different plumage, thus enabling differentiation at birth to be readily made. Auto-sex-linked breeds crossed with other breeds have been found to retain these distinctive characters. Sex-linkage has also been demonstrated in ducks.

Included in the lecture are numerous observations on the results of recent research into agricultural problems, the storage of fruit and meat for export, agricultural engineering and economics.

An appendix dealing with mineral deficiencies in New Zealand volcanic oils, and notes on vitamins brings to a close this interesting summary.

—H. A. REID.

—. (1932). **The Value of Scientific Research.**—*Austral. Vet. J.* **8.** 197-198.

Criticizing the statement made at a recent meeting of the Australian and New Zealand Association for the Advancement of Science that, if economies are found necessary, scientific research should suffer rather than expenditure on administrative control should be curtailed, this editorial article quotes with approval the dicta of the Research Committee of the Imperial Conference of 1930 :—" The severe economic depression from which the British Empire is suffering should be regarded as a reason not for the curtailment, *but for the expansion of expenditure on research*," and " the pursuit of new knowledge is an investment capable of paying higher dividends in the form of practical results than any other type of national activity."—F. BULLOCK.

OFFICIAL AND OTHER REPORTS.

CANADA. (1933). **Report of the Veterinary Director General, Health of Animals Branch, Department of Agriculture, for the Year ending March 31st, 1932.** [HILTON, G.] pp. 53. Ottawa : F. A. Acland. [8vo.]

The first section of the report deals in general with the disease situation and the activities of the Health of Animals Branch. Reference is made to outbreaks of foot and mouth disease in Great Britain and Ireland and to the work of the British Ministry of Agriculture and the Foot and Mouth Disease Research Committee.

No cases of dourine have been found for 12 years, nor of sheep scab for 4 years. Cattle mange has been limited to a few small outbreaks and swine fever to one outbreak. Only one horse was slaughtered for glanders. Two outbreaks of anthrax, one in horses and the other in cattle, were dealt with. A few cases of rabies occurred in previously infected territory.

Swamp fever of horses [infectious anaemia], redwater of cattle and distemper of foxes and other fur-bearing animals are discussed as research problems and in view of the studies in progress at the Animal Diseases Research Institute, Hull, and the Branch Laboratories in Alberta and British Columbia.

The situation with regard to Bang's disease [*Br. abortus* infection] is outlined and its economic importance stressed. Blood testing by agglutination and complement-fixation methods has proved its value and by its adoption, with the proper disposition of infected animals and sanitary measures, the disease can be effectively controlled. Reference is made to the optional policy of the Department and the services it renders, and to the attitude and increasing interest of livestock owners and agricultural representatives, while emphasis is laid on the wide field that is open to practising veterinarians in assisting to establish clean herds and areas.

Progress is reported in the control of bovine tuberculosis and the statement is made " out of 1,842,000 cattle tested under the Department's policies, 172,539 reacted to the initial tests, or 9·4 per cent., but at the last annual tests of nearly 1,000,000 of these cattle not more than 4,755 reacted, or 0·5 per cent." Application for testing herds under the " supervised herd " and the " accredited herd " plans, and for extension of the " area plan " have steadily increased and since the work is accumulative and, under present conditions and resources, self-limiting, the problem of maintenance and future progress is presented from different angles.

Details and statistics of disease outbreaks and tuberculosis eradication are given in the report of the Contagious Diseases Division, which also contains copies of the Ministerial Orders issued during the year, and is followed by the reports of the Meat and Canned Foods Division and of the Pathological Division.

—E. A. WATSON.

CANADA. (1933). **Report of the Pathological Division, Health of Animals Branch, Department of Agriculture.** [WATSON, E. A.] *Rep. Vet. Direct. Gen. Health Anim. Branch, Dept. Agric.* 1932. pp. 45-53. Ottawa : F. A. Acland. [8vo.]

A résumé of the work of the Animal Diseases Research Institute and Pathological Division is given under the following headings :—(A) Tuberculosis ; (B) Infectious Bovine Abortion or Bang's Disease of Cattle ; (C) Virus Diseases ; (D) Parasitology ; (E) Poultry Diseases ; (F) Biological Products ; (G) Routine Laboratory Services.

The titles and authors of the studies made or in progress are as follows :— " Prophylactic Vaccination of Cattle by Means of BCG," by E. A. WATSON, C. W. MCINTOSH and H. KONST ; " Attempted Immunization of Guinea Pigs with Certain Fractions of Dead Tubercle Bacilli," by L. M. HEATH ; " Resistance to Tuberculosis in Guinea Pigs by means of BCG Vaccine, Johne's Bacilli and Dead Bovine Tubercle Bacilli," by C. W. MCINTOSH ; " Bovine Subcutaneous Tuberculosis and the Problem of Skin Lesions of Cattle," by C. A. MITCHELL ; " The Excretion of Tubercle Bacilli from the Udder," by E. A. WATSON ; " Tuberculin Studies," by L. M. HEATH ; " Differential Leukocyte Counts of Cattle in Relation to Tuberculosis," by C. HOEFFLIN and G. E. STANLEY ; " Theisin, An Alleged Cure for Tuberculosis," by C. W. MCINTOSH, C. A. MITCHELL and E. A. WATSON.

" Serum Diagnosis of Infectious Abortion," by C. A. MITCHELL and F. A. HUMPHREYS ; " Studies on *Brucella abortus*," by C. A. MITCHELL and F. A. HUMPHREYS ; " *Brucella abortus* infection with Particular Reference to Infection in Man," by F. A. HUMPHREYS ; " Studies on *B. abortus* and on Culture Filtrates of *B. abortus*," by L. M. HEATH.

" Equine Infectious Anaemia and a Filterable Virus Disease of Horses occurring in the Ottawa Valley," by C. A. MITCHELL, F. A. HUMPHREYS and R. V. L. WALKER ; " Studies on Distemper," by E. A. WATSON and P. J. G. PLUMMER ; " Filter-Passing Forms of Bacteria," by F. H. PRISSICK.

A footnote indicates that the studies referred to or summarized in this report will be published in full at a later date.

The report concludes with a brief statement of the amount of tuberculin and other biological products prepared and issued during the year, and of the rapid growth and extension of routine laboratory services.—E. A. WATSON.

BRITISH SOMALILAND. (1933). **Ninth Annual Report of the Veterinary Department for the Year 1932.** [COCKSEDGE, T. A. B.] pp. 8. [typed fcp.]

The staff of the veterinary department was reduced on grounds of economy during 1932.

The position with regard to contagious diseases was, on the whole, very satisfactory. Contagious bovine pleuro-pneumonia was finally declared as eradicated during the summer, but, later, fresh infection was introduced by a small herd returning over the Abyssinian frontier. The herd, together with in-contacts were quarantined and there was no further spread.

Rinderpest was finally eradicated in November by the quarantine system. One outbreak of anthrax occurred. Camel surra is always prevalent in certain areas : the method of prophylaxis by injection of 3 g. of naganol has given very good results. This is always performed in the Somaliland Camel Corps and native owners are beginning to recognize the value of treatment.

A very bad outbreak of African horse sickness occurred widely throughout

the country. A system of symptomatic febrifuge treatment was employed with success amongst government animals.

The health records of the Somaliland Camel Corps are given. There was a wastage of 12 per cent. during the year. " Boils " and multiple, localized cutaneous necrosis [the condition known in India as " jhooling "] give most trouble among the camels.

The pony stud farm was closed down on grounds of economy and the Chief Veterinary Officer protests against that policy.—J. E.

HÖLZELL. (1932). Jahresbericht der bakteriologischen Fleischuntersuchungsstelle am Schlachthof München 1931. **[Annual Report of the Meat Inspection Department at the Munich Slaughterhouse, 1931].**—*Münch. tierärztl. Wschr.* **83.** 265-266.

Material from carcasses of the following 585 animals underwent bacteriological examination during the year :—40 horses, 404 cattle, 74 calves, 65 swine and 2 sheep. Wherever possible the following portions were examined :—2 pieces of muscle, 2 lymph glands, the spleen, a kidney, marrow of a tibia and a piece of the liver. About 90 per cent. of the flesh was found to be fit for human consumption. The details of the report show the importance of the routine examination of both spleen and liver especially in view of suspected paratyphoid infection.

—F. BULLOCK.

BOOK REVIEW.

CREW, F. A. E. [M.D., D.Sc., Ph.D., Professor of Animal Genetics, University of Edinburgh]. (1933). **Sex Determination.** pp. vii+138. [12 pages of refs.] London : Methuen & Co., Ltd. [8vo.] [3s. 6d.]

The method by which male and female individuals arise has been the subject of much discussion and many theories have been elaborated to account for it, but it was not until the laws of Mendelian inheritance were proved and accepted that a scientific explanation for the determination of sex could be put forward. That this has been done is accepted by all biologists, but by no means universally, primarily due to the fact that the general reader has been unable to keep up with the rapid advance of the subject and it is very welcome to have at hand, in small compass, a clear exposition of the facts.

The book begins with a description of cell division and chromosome reduction, passing on to the role the X and Y chromosomes play in the determination of sex and their distribution in the phenomenon of parthenogenesis. It concludes with a brief account of the evolution of the sex-determining mechanism.

According to the publisher's note, the aim of this series of monographs is " to give brief but authoritative accounts of the present state of knowledge in various departments of Biology " and it may be said that in this case the object has been fully accomplished.

Included in the book is an ample bibliography and a glossary, the latter most necessary for those who are not well acquainted with the subject under discussion

—J. A. NICHOLSON.